

Mica Deposits of the Southeastern Piedmont

Part 9. Thomaston-Barnesville District,
Georgia

Part 10. Outlying Deposits in Georgia

GEOLOGICAL SURVEY PROFESSIONAL PAPER 248-F



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By E. WM. HEINRICH, MONTIS R. KLEPPER, and RICHARD H. JAHNS

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*Distribution and structure of pegmatite
bodies in the areas, their mineralogical
characteristics, and the economic possibilities
of the mica and other pegmatite minerals*



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MICA DEPOSITS OF THE SOUTHEASTERN PIEDMONT

PART 9. THOMASTON-BARNESVILLE DISTRICT, GEORGIA

By E. WM. HEINRICH, MONTIS R. KLEPPER, and RICHARD H. JAHNS

ABSTRACT

Between August 1942 and January 1946, a total of 58 mica mines and prospects were examined in the Thomaston-Barnesville district, Ga. The district includes parts of Upson, Lamar, and Monroe Counties.

The most widespread rocks in the area are augen gneiss, biotite gneiss, and hornblende gneiss; igneous rocks occur only in small stringers and dikes. The foliation of the metamorphic rocks trends northeast and dips southeast. Much folding and some faulting preceded the emplacement of pegmatite.

The pegmatite occurs in bodies 2 in. to 25 ft thick. Most are less than 200 ft long, but a few may be as much as 1,000 ft long. Many of the bodies are conformable to the foliation of the enclosing rocks and strike north to northeast. The others cross the foliation and trend in various directions. Several bodies plunge southwest, and one plunges north.

Zones were recognized in all the well-exposed pegmatites—which constitute half the total that are known—and may be present in the poorly exposed pegmatites. Massive quartz cores and plagioclase-quartz wall zones are common. Intermediate zones of plagioclase and quartz also are common. Fracture-filling and replacement units are rare. The essential minerals are quartz, plagioclase, perthite, and muscovite. Biotite, garnet, tourmaline, beryl, and apatite are common accessory minerals.

Most of the mica produced from the district has come from core-margin zones. Reeves are the commonest defect, but flat sheets are readily obtained from many reeved books. Most of the mica is brown. A total of several hundred thousand pounds of sheet mica probably has been obtained from the district. Between June 1942 and January 1945 the district yielded 143,780 lb of trimmed mica; 15 percent of this was no. 1 quality, 40 percent no. 2, and 45 percent no. 2 inferior.

INTRODUCTION: FIELD WORK AND ACKNOWLEDGMENTS

Recent investigations by the Geological Survey in the Thomaston-Barnesville district were begun by T. L. Kesler, who examined 27 mica deposits in August and September 1942. J. C. Olson mapped the Mitchell Creek deposit and revised Kesler's map of the Early Vaughn mine in September 1943. A program of systematic and detailed mapping was started early in 1944

by M. R. Klepper and was continued intermittently until January 1946 by Klepper, E. Wm. Heinrich, R. H. Jahns, and R. W. Lemke. Field assistance was contributed by W. B. Allen, L. C. Pray, and J. R. Wolfe, Jr. Of the 58 deposits that were examined, 38 were in Upson County, 8 in Lamar County, and 12 in Monroe County. A total of more than 100 deposits comprising 148 pegmatite bodies is recorded (pl. 27). Descriptions of about 50 mines and prospects have been abstracted in part from the report of Furcron and Teague (1943, pp. 19-79). Most of these deposits were visited, but few of them were well enough exposed for detailed study during the present investigations.

Generous assistance in locating deposits and in supplying information concerning their history and operation was given by Harry Amphlett, E. D. Harris, and O. A. Wakefield, field engineers assigned to the Thomaston office of the Colonial Mica Corporation, and by J. M. Davis, engineer in charge for the Alabama and Thomaston-Barnesville districts. Miners and property owners were cordial and cooperative throughout the course of the work. Oliver Howell, of Culloden, Ga., furnished historical data on many operations that he conducted for J. E. Burleson during the period 1918-22.

In May and June 1945 the United States Bureau of Mines explored the Mitchell Creek, Stevens-Rock, Battles and Chatfield, and Early Vaughn deposits by means of diamond-drill holes. The hole locations are shown on the maps of these deposits, and information that was obtained from the drill cores is indicated in the structure sections. It is a pleasure to acknowledge the wholehearted cooperation of W. A. Beck, engineer in charge of the exploration.

GEOGRAPHY OF THE DISTRICT

The Thomaston-Barnesville district, which comprises parts of Upson, Lamar, and Monroe Counties in west-central Georgia, is 30 miles long in a northeast-south-

west direction and about 18 miles in maximum width. It is in the Piedmont province, about 10 miles north of the fall line and 50 to 60 miles south and southeast of Atlanta, and includes the towns of Thomaston (near the southwest end), Forsyth (in the northeastern part), and Barnesville (near the center). The Southern Railway passes through Yatesville, and the Central of Georgia Railway through Forsyth, Barnesville, and Thomaston. Paved United States Highways 19 and 41 and Georgia Highways 7 and 72 cross the district from north to south, several graveled roads cross it from east to west, and a network of poor to good dirt roads provides access to intervening areas. Nearly all the mines and prospects can be reached by automobile.

The deposits are in gently rolling country that ranges in altitude from 400 ft along the southeast side of the district to about 1,000 ft on ridges along its northwest margin. The average relief along the larger streams is 150 ft. The southern part of the district, chiefly in Upson County, is drained by Potato, Swift, and Tobler Creeks, southwestward-flowing tributaries of the Flint River. Monroe and southern Lamar Counties are drained by Little Tobesofkee, Tobesofkee, and Rum Creeks and by the Towaliga River, all southeastward- and eastward-flowing tributaries of the Ocmulgee River. The divide between the two drainage systems lies near the Upson-Monroe County line and passes northward across the district through Barnesville and central Lamar County. Much of the land is farmed, and the remainder is covered by stands of pine or heavy growths of underbrush.

Exposures of unweathered rock are scarce, and yellow-brown to deep reddish-purple soils constitute the typical mantle. At some mines, such as the Mitchell Creek and Stevens-Rock, hard, unweathered rock was encountered within a few feet of the surface. In contrast, both country rock and pegmatite are decomposed in the Brown mine area to a depth of 125 ft. The feldspar, especially plagioclase, is at least partly kaolinized in the deepest workings of most small mines. Among the few mines in which work was begun in decomposed rock and continued below the zone of weathering are the Blount No. 1, Adams, Early Vaughn, and Battles.

GEOLOGY OF THE DISTRICT

ROCK FORMATIONS

METAMORPHIC ROCKS

The most widespread rocks in the district are inter-layered mica gneiss and schist that are shown on the State geologic map as augen gneiss (Stose and Smith, 1939). Inasmuch as augen gneiss actually appears to

be rather scarce, it may be more appropriate to refer the rocks to the Carolina gneiss of Keith. Biotite gneiss and biotite-garnet gneiss, commonly with admixed granitic material, are the most abundant types. In some places, granitic material has been added to produce a hybrid rock that consists of quartz, feldspar, and garnet, with traces of biotite. The original foliation is faintly preserved by poorly defined layers of coarse garnet crystals. Hornblende rocks, probably assignable to the Roan gneiss, were observed at a few mines and prospects in the northeast end of the district.

The area of biotite gneiss is bounded on the northwest and west in Upson County and on the north-northwest in Lamar County by the Pine Mountain formation of Galpin (1915, pp. 74-76), which consists of fine-grained quartz-mica schist and quartzite. In Monroe County the north-northwest boundary of the gneiss belt is a thrust fault (fig. 114) that can be traced east-northeast

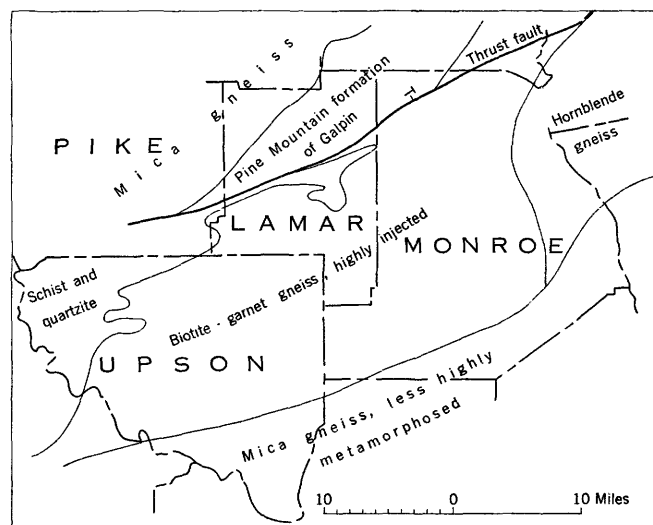


FIGURE 114.—Geologic map of the Thomaston-Barnesville district and adjacent areas, Georgia.

to the general contact between biotite and hornblende gneisses in Jasper County. The few pegmatites on the north side of the fault in Lamar County are of little economic significance.

IGNEOUS ROCKS

The only large igneous bodies that have been noted in the district are three bodies of a dense, granitoid, garnet- and pyroxene-bearing rock in northern Upson County (fig. 114). Each is about 2 miles in average diameter. The rock weathers to form conspicuous rounded boulders. Much granitic material has been introduced along foliation planes in the surrounding biotite gneiss, which has been converted to a quartz-feldspar-garnet granite where impregnation and alteration have been complete or nearly so.

Diabasic dikes, probably of Triassic age, occur in Monroe County. They strike northwest across the regional structure of the older rocks. Small diabase dikes cut the pegmatite bodies of the C. A. Ensign and New Ground deposits.

STRUCTURE

The attitude of the foliation in the metamorphic rocks varies widely, but its general trend is northeast and its dip is prevailingly steep and to the southeast. The structure is much less uniform than in the Alabama district to the west, and the variation in form and attitude of the enclosed pegmatite bodies is correspondingly greater. Much folding and faulting preceded the emplacement of the pegmatites. Folds occur at the Brown, Barron, and Joe Persons deposits. Anticlines at the Mitchell Creek deposit are broken along parts of their crests and can be traced into faults down their plunge. The large overthrust fault that bounds the district on the north-northwest has already been mentioned. Faulting and fracturing have taken place since the emplacement of the pegmatites but have had very little effect upon them.

DISTRIBUTION AND OCCURRENCE OF THE PEGMATITES

All the major pegmatite deposits occur in a northeast-southwest belt of mica gneiss and schist that both contain much igneous material. The belt is bounded on the north by the Pine Mountain formation, on the northeast by hornblende gneiss, and on the south by less metamorphosed biotite gneiss and schist. There are a few pegmatite bodies north of the thrust fault, and several others occur in hornblendic rocks at the north end of the district. The pegmatites do not appear to be related to the three small bodies of granitic rock. The thrust faulting may have obscured any relationship of the pegmatites to larger masses of intrusive rock.

GENERAL STRUCTURAL FEATURES OF THE PEGMATITES

SIZE

The pegmatite bodies that have been mined range in thickness from 2 in. to about 25 ft. One of the thinnest is at the Watson mine (1½ ft or less), and among the thickest are the Barron (20 ft), Kelly O'Neal No. 5 (about 20 ft), Early Vaughn (25 ft), and Battles (about 25 ft). In general the average thickness is between 4 and 8 ft and hence is somewhat greater than in the Alabama deposits. Several deposits have been mined to depths of 100 ft, but very few have been explored below 125 ft. At the Brown mine a series of pegmatite

pod and lenses has been worked over a strike distance of 1,000 ft, and the Duke and Adams pegmatites have been opened over 330 ft of their lengths. The known strike length of most deposits, however, is less than 200 ft, and in many it is much less.

FORM AND ATTITUDE

Concordant and discordant pegmatite bodies appear to be about equally abundant in the district. This is in marked contrast to the Alabama district, in which concordant bodies predominate. The prevailing strike of both pegmatites and gneissic foliation in the country rock is northeast, and the general dip is southeast. More than half the pegmatites range in strike from north to N. 60° E., and about two-thirds of them range in dip from moderately southeast to vertical (fig. 115). Very

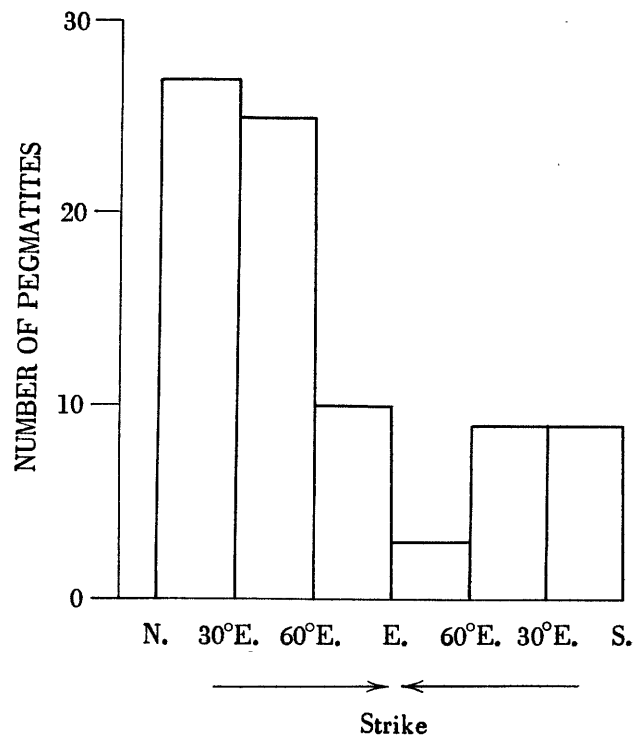


FIGURE 115.—Strikes of pegmatite bodies in the Thomaston-Barnesville district, Georgia.

few dips are less than 30°. Nearly all the determinable plunging structures are directed to the southwest. The only major exception is the Early Vaughn deposit, in which the structures plunge north.

The pegmatite deposits can be classified on the basis of their form and relationship to the country rock as follows:

1. Tabular bodies, lenses, and pods.
 - A. Concordant.
 - B. Discordant.

2. Trough-shaped bodies (normal and inverted).

A. Concordant.

B. Discordant.

3. Other bodies.

Most of the pegmatite bodies in the district can be assigned to class 1, and most of those whose shape is not known within narrow limits probably are of this type also. Four trough-shaped bodies are recorded. The Joe Persons deposit is a concordant body in a synclinal trough; the Corley is a discordant body that forms a trough; and the Stevens-Rock deposit is discordant and anticlinal, resembling an arch. The Barron body, which is concordant, resembles a trough with a nearly vertical slope. More complex bodies, which are in part tabular and in part troughlike, generally are T- or Y-shaped in plan and section. The Early Vaughn and Battles dikes, which cut across the foliation of the enclosing country rock in most places, are like an inverted Y in section. On the other hand, only the tabular part of the main Mitchell Creek pegmatite, which is Y-shaped in plan, cuts across the country-rock structure.

INTERNAL STRUCTURE OF THE PEGMATITES

Zonal structure is recognizable in most of the well-exposed pegmatites, but about half the bodies in the district are so poorly exposed that zones cannot be identified with assurance. In general, however, unzoned deposits are relatively scarce. The quartz-plate layering that is a characteristic feature of many Alabama pegmatites is very rare, and most of the deposits seem to be more complex than those in Alabama. They can be classified on the basis of their internal structure, and the relative abundance of each type is shown in figure 116.

Pegmatites in which zones are not apparent or not well developed are relatively simple in form and composition. These are grouped in figure 116 as unzoned pegmatites. They generally consist of (a) a medium- or coarse-grained intergrowth of quartz, feldspar, and muscovite, with accessory biotite, garnet, and tourmaline, or (b) burr rock, an aggregate of aligned small books and flakes of muscovite in quartz. The first type, which is the more common, includes some of the disseminated mica deposits. The feldspar generally is plagioclase, although both plagioclase and perthite may occur in the same deposit.

The pegmatite bodies with two zones contain cores of medium-grained granitoid rock, with outer zones of (a) finer-grained material of similar composition, (b) burr rock, or (c) mica-rich pegmatite. The central zone generally consists of quartz, plagioclase, and muscovite and commonly contains perthite and biotite as

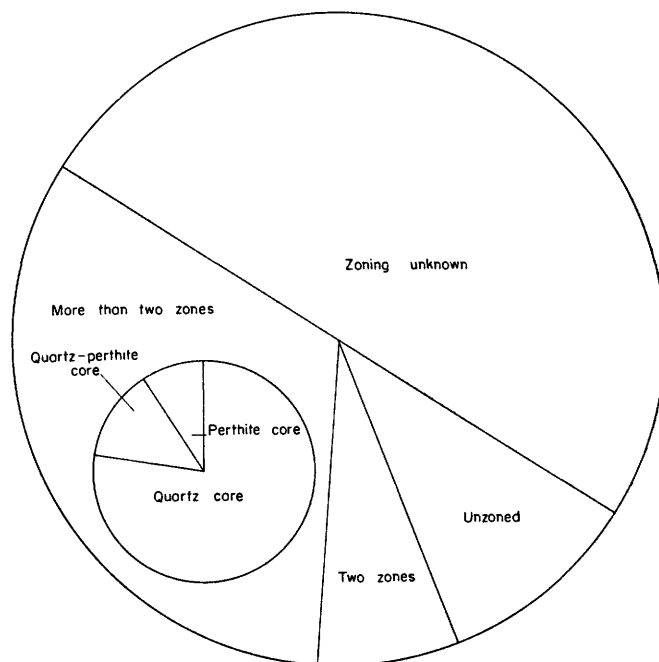


FIGURE 116.—Relative abundance of pegmatite types, on the basis of internal structure, in the Thomaston-Barnesville district, Georgia.

well. Tourmaline, garnet, and apatite are the accessory minerals. Disseminated mica deposits and a few mica deposits of the wall-zone type occur in the bi-zonal pegmatites.

The pegmatite bodies with more than two zones, which are characterized by monomineralic or bimineralic cores, contain three to five zones. A thin selvage or border zone of fine-grained quartz-feldspar rock is commonly present. Three typical zone sequences, from wall to core, are:

Sequence A

1. Border zone.
2. Wall zone of medium-grained quartz, plagioclase, and muscovite.
3. Core of massive quartz or, rarely, blocky perthite.

Sequence B

1. Border zone.
2. Mica-rich wall zone.
3. Medium-grained intermediate zone of plagioclase, quartz, and a little muscovite.
4. Core of massive quartz or, rarely, blocky perthite.

Sequence C

1. Border zone.
2. Wall zone of medium-grained quartz and plagioclase.
3. Intermediate (core-margin) zone rich in mica.
4. Core of massive quartz or, rarely, quartz and blocky perthite.

In the third type of pegmatite, coarse perthite crystals may occur as a separate, discontinuous inner interme-

diate zone along the margins of the quartz core, and in such a deposit the flanking mica-rich unit constitutes an outer intermediate zone, even though it is in direct contact with the core wherever the perthite is absent.

With few exceptions, pegmatite units formed by the filling of fractures or by replacement processes could not be identified in the deposits of the district, nor were they observed in any of the other Georgia deposits. In the Adams pegmatite a few small veinlets of sugary albite cross perthite crystals, and Galpin (1915, p. 79) observed fine-grained quartz-albite veinlets in a specimen from a pegmatite a quarter of a mile west of Juliette, in Monroe County. In Baldwin County, east of the district, late-stage veinlets of epidote cut bodies of pegmatite and aplite (Galpin, 1915, p. 58).

MINERALOGICAL FEATURES OF THE PEGMATITES

The essential minerals of the pegmatites are quartz, plagioclase, perthitic microcline, and muscovite. Biotite, garnet, tourmaline, beryl, apatite, pyrite, pyrrhotite, sericite, and graphite are the accessory minerals. A piece of allanite was found at the Smith mine in Monroe County.

Massive white quartz, the most common core-forming mineral, also occurs in granular intergrowths with plagioclase and perthite and as small, clear to smoky pods in a feldspar-rich matrix. Burr rock, massive to granular quartz with thin streaks of small muscovite flakes and books, is present in many deposits. Perthite is most abundant in cores and intermediate zones, either as coarse, blocky aggregates or as large masses in quartz. It also occurs in medium-grained intergrowths with quartz and plagioclase. Plagioclase is the more common feldspar in the outer parts of zoned bodies and in relatively homogeneous pegmatites. Most is oligoclase. Granular to blocky albite is very rare, and no cleavelandite has been observed.

Muscovite generally is concentrated in wall or intermediate (commonly core-margin) zones and also occurs as a minor constituent in medium-grained feldspar-quartz rock. It is sparsely disseminated throughout the poorly zoned deposits. Late-stage, light-green sericite occurs along fractures and cleavage planes in the feldspar of many pegmatites.

Biotite, the most common accessory mineral, generally occurs as small sheets and books in quartz-plagioclase pegmatite. Reddish-brown garnet, black tourmaline, and gray-green apatite are about equally abundant and are found chiefly in wall zones or in pegmatite bodies that are not well zoned. Although pyrite and pyrrhotite were observed in relatively few deposits, they are not uncommon in those that contain unweathered pegmatite. Presumably they have been altered and re-

moved from much of the weathered pegmatite. Graphite was found in fine-grained pegmatite that was exposed by diamond drilling at the Battles and Early Vaughn mines.

Beryl was found at the B. S. Gibson, Blount No. 1, Herron, Adams, J. T. Means, Stevens-Rock, Colbert, Early Vaughn, and Battles deposits. In the first five of the nine deposits it is known to occur along the margins of quartz masses. It is greenish yellow to deep blue, with a porcelainoid to glassy luster. Crystals as much as 7 in. in diameter, suitable for use as gems, occur in the Herron pegmatite.

Plagioclase and quartz apparently were the first minerals to begin crystallization and were followed by muscovite and microcline. Microcline continued to crystallize throughout much of the remaining period of pegmatite formation, and quartz throughout the entire period. Although some muscovite may have formed later than the microcline, most of it probably crystallized before the bulk of the potash feldspar. Biotite, garnet, apatite, and tourmaline appear to be essentially contemporaneous minerals whose development may well have begun shortly after that of the muscovite. Beryl and the last of the muscovite, which were formed nearly contemporaneously, antedated the consolidation of the pegmatite cores. Sericite, pyrite, some quartz, and a little sugary albite are late-stage constituents.

ORIGIN OF THE PEGMATITES

The pegmatites are not satellitic to any exposed large masses of granitic rock; hence the nature of the parent material can only be conjectured. It probably was monzonitic to granodioritic in composition, as are most intrusive rocks in the Piedmont. The emplacement of the pegmatites was controlled in large measure by fractures and foliation in the metamorphic country rock and, to a minor degree, by folds. Lenses and tabular masses followed foliation planes to form sills and followed fractures and faults to form dikes. Conformable trough-shaped or arch-shaped pegmatite masses were emplaced along the keels of synclines and the crests of anticlines. Discordant through-shaped bodies have tended to form with one limb along a fracture or fault and the other limb parallel with the country-rock foliation.

Consolidation of the pegmatite bodies, which appears to have proceeded from the walls inward, was accompanied by a progressive coarsening of grain. Quartz and microcline, the last essential minerals to form, commonly occur as very large masses. Textures, structures, and minerals characteristic of deuteric or hydrothermal replacement processes are very rare or absent,

and the crystallization of most deposits seems to have taken place with little or no addition of material after the first injection of magma.

ECONOMIC ASPECTS OF THE PEGMATITE MINERALS

MICA

GENERAL PROPERTIES

Commercial quantities of mica occur in the wall zones and intermediate (generally core-margin) zones of pegmatites. Very few deposits in which the mica is disseminated through relatively homogeneous pegmatite have been mined profitably. Core-margin deposits appear to be the most abundant of those that have been worked, although many of the smaller, poorly exposed deposits may be of the disseminated type.

In general, the mica is flat, hard, clear, free splitting, and of very good quality. Cracks, quartz inclusions, and "A" structure are the most widespread imperfections. Less common are ruling; widely spaced reeves; "cross books" of mica (intergrowths of two books with their cleavage directions normal or nearly so); inclusions of tourmaline, apatite, pyrite, and garnet; and intergrowths of biotite. Wedge and herringbone structures and heavy black specks are almost entirely absent. The prevailing color of the mica is light cinnamon brown. Green mica occurs in a few pegmatites, and eight deposits contain both greenish and brown mica. Color banding is rare.

TYPES OF DEPOSITS

DISSEMINATED DEPOSITS

Disseminated mica generally occurs in small, poorly zoned or unzoned pegmatite bodies. The mica books, though not abundant, are commonly hard and flat. They tend to be small. Cracks and quartz inclusions are the chief defects. The color is almost invariably a cinnamon brown. In general the disseminated deposits are of very minor commercial interest, although the tabular part of the Mitchell Creek pegmatite is a notable exception.

WALL-ZONE DEPOSITS

The wall-zone mica is typically flat, hard, free splitting, and of good quality. The color generally is cinnamon brown. Cracks, warping, ruling, "A" structure, and inclusions of tourmaline, quartz, apatite, and pyrite are the most common imperfections. Among the commercially important wall-zone deposits are the Early Vaughn, Brown, Mauldin, Barron, Carter, and part of the Mitchell Creek. A large proportion of the mica produced in the district has been obtained from deposits of this type.

CORE-MARGIN (INTERMEDIATE-ZONE) DEPOSITS

Core-margin deposits are the most abundant of the three types, but not all the pegmatites with coarsely crystalline cores contain such mica zones. Core-margin mica is characterized by cracks, warping, and "A" structure. Not all the "A" mica occurs in these zones, but books from nearly two-thirds of the observed core-margin zones are strongly marked by this structure. Most of the greenish mica in the district is core-margin "A" mica, and, where both brown flat and greenish "A" micas are present in a single deposit, the flat mica almost invariably occurs in the wall zone and the "A" mica around the core. The Adams, Battles, and Boyt mines are typical core-margin or intermediate-zone deposits. In the Clay Cheek mine, on the other hand, the mica occurs in an intermediate zone, but not along the margin of the core.

OTHER MINERALS

Little or no attempt has been made to mine pegmatite minerals other than mica. In general, the deposits are too thin to support large-scale kaolin and feldspar operations, even where the minerals are sufficiently well segregated. Perthite of good quality might be obtained as a byproduct of mica mining at the Battles, Adams, and Reynolds mines, where it is unkaolinized and relatively free from quartz and mica. Beryl is not sufficiently abundant in any of the deposits to warrant attempts at recovery, even as a byproduct.

MINING

HISTORY

Indians are said to have obtained mica from the Stevens-Rock mine many years ago, but the first systematic mining began about 1916, when the Brown mine was opened. Neither Galpin (1915, pp. 79-82, 85-86), who visited the area about 1913, nor Sterrett (1923, p. 86), who examined many Georgia mica deposits in 1908 and 1914, reported any significant mining activity in the district. Extensive operations have been confined to two periods, 1917-24 and 1941-45. During the first period much work was done in Upson County by Oliver Howell and John McDonald for J. E. Burleson and by C. A. Nichols and Martin and Frazee. Calvin Battles and operators Lambert, Way, Dale, and Phinazee prospected and mined many pegmatites in Lamar and Monroe Counties.

In 1941 the Meyer and Brown Corp., of New York City, began to mine the Early Vaughn deposit. By September of the following year eight mines were being developed. The Georgia Mica Co. (J. J. Egan and

Oliver Howell) reopened the Battles mine in 1942 and worked several other deposits until 1944. The Mitchell Creek mine, which was developed from a small prospect, was worked until 1945 by S. P. Cronheim. Power-shovel and dragline operations, which were carried on in 1944 at the Colbert mine by the Woody Gap Mining Co. of Atlanta, at the Johnson and Herron mines by the Rutland Construction Co., also of Atlanta, and at the Brown mine by Gomilo and Parrish, of Thomaston, were not very successful. Also active during the recent mining period were the Burgess Mining Co., of Spruce Pine, N. C., and the Asheville Mica Co., of Biltmore, N. C. A field office and custom mica shop were maintained in Thomaston by Colonial Mica Corporation from November 1942 until late in January 1945.

MINE WORKINGS AND MINING METHODS

Weathering of the rocks generally extends to depths of 40 to 60 ft, and kaolinization of the feldspar is complete to the level of ground water in most deposits. Mine operators have shown a marked preference for working the relatively soft material that lies between the surface and levels at which ground water materially increases operating costs. This preference is shown by the large number of shallow, closely spaced workings that have been sunk in many deposits. Relatively few mines have involved extensive operations in hard rock or at levels beneath the water table.

Both open-cut and underground mining methods have been employed. Among the larger mines, the Brown, Mauldin, Reynolds, Battles, and Adams have been worked chiefly by subsurface methods. The Mitchell Creek and Stevens-Rock, which are hard-rock deposits, were mined in open-cuts. Both surface and subsurface operations have been carried out at the Corley, Colbert, and Early Vaughn mines. Owing to the moderate or steep dips of many of the pegmatites, vertical shafts with appended stopes, drifts, and short crosscuts are common. Adits have been driven at few deposits, not only because the relatively flat topography would seriously restrict the depth to be gained beneath the outcrops, but also because of the miners' disposition to work downward from the outcrops in weathered pegmatite.

PRODUCTION

No accurate records of production during the period 1917-24 are available, but the output probably amounted to several hundred thousand pounds of trimmed mica. Prior to 1908 a large proportion of the Georgia production was obtained from the Lumpkin County-Union County area in the North Georgia dis-

trict, and from 1909 to 1918 most of the mica was mined in the Cherokee County-Pickens County area. Since 1918, however, production from the Thomaston-Barnesville district has increased markedly with respect to that from the other districts, and during the period 1941-45 it was the only important mica mining district in the State.

About 143,780 lb of punch, trimmed punch, and sheet mica was produced from Georgia deposits between June 1942 and January 1945. Of this total, 114,165 lbs, or 79 percent, was obtained from the Thomaston-Barnesville district. The output of the Adams, Battles, Early Vaughn, and Mitchell Creek mines represents 62 percent of this total. The mica obtained from the district during World War II comprised 15 percent no. 1 quality, 40 percent no. 2, and 45 percent no. 2 inferior.

FUTURE OF THE DISTRICT

Future production from the district will depend largely upon the discovery of new deposits and the development of new mines from existing prospects. Many of the mines from which a substantial proportion of the recent production was obtained either have been worked out or have been left in such condition that their reopening might well involve expenses greater than the value of the mica that could be recovered from them. On the other hand, many deposits that have been prospected only superficially appear worthy of further development.

DESCRIPTIONS OF DEPOSITS

UPSON COUNTY

BELL MINE

The Bell mine is 3.2 miles S. 22° W. of Thomaston and 0.5 mile east of Bell Creek (location 1, pl. 27). It is on the Davis estate on top of a low rise 1,100 ft west of the Davis farmhouse. The deposit was opened by Tom Bell during World War I and was worked in 1918 by Charles Nichols and L. M. Johnson. It was leased shortly thereafter to J. E. Burleson, who sank a 33-ft shaft in decomposed pegmatite to the level of ground water. This opening has since caved to form a pit (fig. 117). An inclined tunnel, driven for the removal of waste, connected with the shaft not more than 20 ft beneath the surface. L. M. Johnson, who again mined the deposit for a short time in 1932, states that a mica crystal weighing more than 500 lb was obtained. Faul Brown is reported to have been the last operator. No work was done during World War II.

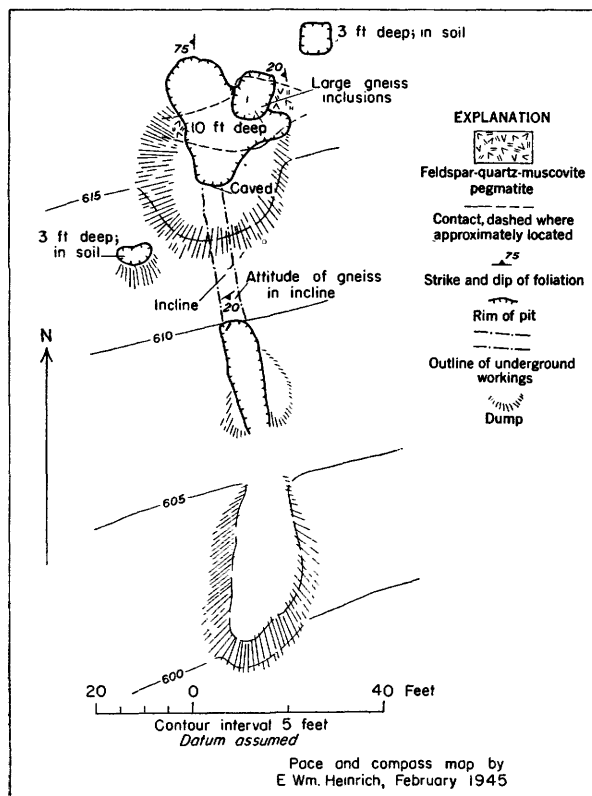


FIGURE 117.—Geologic map of the Bell mine, Upson County, Ga.

The pegmatite body, which is exposed in the pit, strikes east, is vertical, and is very irregular in shape. It cuts across the foliation of the enclosing biotite gneiss and contains several large, irregular inclusions of country rock. The maximum exposed thickness of pegmatite is about 8 ft. The mass is not well zoned and consists chiefly of quartz, muscovite, and minor quantities of feldspar. Black tourmaline and biotite are accessory minerals. Mica appears to have been abundant. Books as large as 3 by 4 in. were noted. The mica occurs in well-formed deep cinnamon-brown crystals that are flat and hard. Cracks and inclusions of quartz are the chief defects.

GRACE PROSPECT

The Grace prospect, which is 3.7 miles S. 20° W. of Thomaston (location 2, pl. 27), is owned by Ida Taylor and was worked by H. L. Grace from April to July 1944. Two shafts were sunk, and one was later refilled. The open shaft, at the north edge of the road, is 22 ft deep. The pegmatite body, which is 5 ft thick at the collar and 8 ft thick near the bottom, strikes N. 40° E. and is vertical. It is a medium-grained aggregate of quartz, perthite, muscovite, and abundant biotite. Muscovite occurs in scattered books. It is clear, hard, flat, free splitting, and light cinnamon brown. Most of the

books are less than 3 in. in diameter. The outlook for future production is not favorable.

BROWN (PARRISH) MINE

The Brown deposit, one of the most extensively worked mica deposits in Georgia, is 4.2 miles S. 2° W. of the Thomaston town square (location 3, pl. 27). The mine was opened by means of shallow shafts in 1916, and small-scale mining was carried on until 1920, when the property was leased by J. E. Burleson and operated intensively for about 3 months. Several shafts were sunk and a 100-ft adit was driven from a point near the southwest end of the deposit. In 1933 L. M. Johnson sank two shafts to depths of 50 and 75 ft but recovered little mica. An incline was driven into the north end of the deposit in 1940 by C. M. Wacaster and a Mr. Cooley, and in 1941 operations were continued by Wacaster and Arthur J. Gomilo. In 1942 the Georgia Mica and Feldspar Corp., of which Gomilo is president, purchased the property from Miles R. Brown and mined almost continuously until 1944. During the spring of 1944 Gomilo and a Mr. Parrish striped and trenched the southwestern third of the deposit by dragline methods.

The principal workings, which lie 200 to 300 ft northwest of the road, are grouped in a northeastward-trending belt that is 100 ft in maximum width and extends across the top and down both sides of a broad knoll for a distance of nearly a thousand feet. They include two inclines; a long adit; at least 34 shafts; many drifts, crosscuts, and small stopes; and several shallow pits (pl. 28). The depth of these openings ranges from 6 to more than 125 ft, but even in the deepest faces both pegmatite and country rock are thoroughly weathered. Many of the workings have caved to form small, individual rounded depressions and larger areas of subsidence.

The dragline cut, which is V-shaped in section for most of its 335-ft length, is 45 to 70 ft wide and 10 to 22 ft deep along its central trough (pl. 28). Its southwest end roughly coincides with the caved portal of the southwestern adit, and its northeast end is near three old shafts that lie in an east-west line. Excavation of this pit involved the partial or complete destruction of at least 13 old shafts and cuts and shallow but extensive workings from them. The cut did not reach the bottom of the weathered zone, either in pegmatite or in country rock, and its sides slumped rapidly after it was abandoned.

Excellent exposures in the walls of the most recent workings demonstrate that pegmatite occurs as a series of lenses and stringers, most of which are less than 4 ft in maximum thickness. In general they are conform-

able with the foliation of the country rock, which is a fine- to medium-grained quartz-biotite schist that has been somewhat altered by granitic and pegmatitic material. Some layers are highly garnetiferous. The closely spaced foliation planes strike northeast to east-northeast. Steep west dips are characteristic along the southeast margin of the pegmatite belt and in exposures along the Talbotton road, but in the central and northwesterly parts of the belt the dip is consistently to the northwest. Thus the pegmatite appears to occur along an anticlinal axis, which is broken in at least one place by a well-defined fault (pl. 28).

Only two groups of underground workings are of considerable extent. Prior to 1920 a 40° incline was driven N. 10° W. from the bottom of a 15-ft vertical shaft (section A-A', pl. 28). This incline was bottomed at the approximate level of ground water, 68 ft beneath the surface, and drifts were extended along the northwest contact of a pegmatite lens for distances of about 75 ft to the northeast and southwest. A vertical shaft later was sunk to connect with the bottom of the incline but was abandoned before the connection was made. It was deepened to 90 ft by J. E. Burleson in 1920 but was again abandoned because of unusually heavy ground. A second vertical shaft was sunk in country rock about 60 ft to the northwest but was ended in partially kaolinized pegmatite at the 125-ft level. A drift that was driven south and west-southwest at about the 100-ft level connects with the incline and adjacent vertical shaft and extends nearly 100 ft beyond them (pl. 28).

The other group of extensive workings dates from 1940. The main incline extends west-southwest for about 190 ft in the northeastern part of the deposit. It slopes at an angle of 15° for the first hundred feet and at about 5° for the remainder of its length (section B-B', pl. 28). Much of its lower part is not accessible. At a point 120 ft from the portal the incline is not far southeast of the workings from the deepest vertical shaft and is at about the same level. Mica was mined from quartz-rich pegmatite at several places in the incline and in short appended crosscuts and drifts. A crosscut driven northwest from a point 25 ft from the portal encountered pegmatite from which only a little mica was recovered. In the walls of all crosscuts intimately interlayered schist, partially pegmatitized schist, and thin lenses of pegmatite and quartz are exposed. None of the workings in the northeastern part of the deposit extends below the main incline and the deepest shaft, and those in the southwestern part of the deposit likewise are bottomed above the level of the long adit. The depths and approximate outlines of some of these openings are shown in plate 28.

In general the pegmatite is a relatively homogeneous aggregate of white to cream-colored kaolinized feldspar and relatively little quartz and muscovite. A few of the masses, however, contain an unusually high proportion of quartz. The cream-colored kaolinized feldspar appears to have been perthite; the white, plagioclase. Biotite is a minor constituent of some of the lenses. Most of the commercial concentrations of mica have been found alongside septa or inclusions of wall rock.

A typical mica concentration was worked during 1944 in a 20-ft shaft 180 ft west of the mica shed. In this shaft and an appended short drift pegmatite is bounded on the north by decomposed gneiss. A concentration of muscovite books occurs along the south margin of a country-rock inclusion 1 ft in average thickness. Most, if not all, of the mica obtained from the deposit occurred along similar inclusions or along the contacts of the pegmatite lenses themselves. Both the pegmatites and the mica shoots within them are discontinuous, and their probable distribution is extremely difficult to determine in detail. The many workings reflect repeated attempts to expose continuations of mica shoots that were followed downward from the surface. Workable mica concentrations do not occur along all inclusions of country rock, and trial-and-error methods of exploring them have been found necessary.

The mica is clear, pinkish buff to cinnamon brown, and of poor to moderately good quality. Excellent mica, which included sheets 4 by 6 in. and larger, is said to have been obtained from some of the older workings. Recent lots of mica, however, have yielded less than 1.5 percent trimmed sheet and punch mica. The chief defects are warping, cracks, clay stains, small inclusions of quartz, and a tendency toward lockiness. It seems likely that most operations in the deposit were conducted at a loss. Although bulk removal of mica-bearing ground would seem to be a feasible method of mining such soft material, the recovery of mica from the dragline cut was not sufficient to meet expenses.

MAULDIN MINE

The Mauldin deposit is 3.7 miles S. 24° E. of the Thomaston town square (location 8, pl. 27). The mine workings are on both sides of the road. The north, or old, part of the mine is owned by the Colonial Mica Corporation and the south, or new, part by T. H. Mauldin. Pegmatite was not discovered at the surface, but was encountered in the digging of a water well 80 ft northeast of a now-abandoned dwelling (pl. 29). The first mining was done about 1916 by Martin and Frazee. During World War I C. A. Nichols, of Spruce Pine, N. C., located and traced the outcrop of the deposit and mined it to depths of 30 ft or more by means of three

shafts, one of which is south of the road. The two shafts north of the road have caved to form rounded pits. As exposed in these workings, the pegmatite forms a somewhat sinuous dike that trends slightly east of north and dips very steeply east. It ranges in thickness from 2 to 12 ft.

In 1918 J. E. Burleson leased the mine and began extensive operations. According to Oliver Howell, who directed the work, a shaft was sunk 90 ft down the dip of the dike from a point north of the road and east of the dwelling (pl. 29). Stopes were carried northward to the discovery opening, which is said to be about 70 ft deep (section *B-B'*). A drainage tunnel was driven west-southwest from the bottom of an adjacent ravine to intersect the workings 63 ft below the shaft collar. A second shaft was sunk vertically in country rock from a point 15 ft southeast of the incline shaft. The depth at which pegmatite was encountered is not known, but the bottom of the shaft at about the 100-ft level is in pegmatite. This new opening was connected with the stope to the north, and a new stope was extended about 60 ft southward. In it the pegmatite was 12 ft thick and dipped east at a lower angle than at shallower depths. These operations are said by Howell to have yielded 4,800 lb of sheet mica, 25 tons of punch, and about 90 tons of scrap. The largest sheets obtained were 6 by 8 in.

The Asheville Mica Co., of Biltmore, N. C., obtained a lease in July 1942 and during the following 6 months cleaned out the old shaft south of the road and sank a 105-ft vertical shaft in country rock to the east. A crosscut was driven west at the 100-ft level to intersect the dike at the bottom of the inclined shaft (section *C-C'*, pl. 29), and a drift that was extended 25 ft south and 45 ft north encountered the bottom of the old workings to the north. The pegmatite did not contain enough mica for profitable operation. In January 1944 the Asheville Mica Co. resumed the work of sinking the vertical shaft, and a drift was started northward along the footwall of the dike at the 128-ft level. A small amount of high-quality sheet mica was obtained, but the yield of mine-run mica was so low that operations were stopped in July.

The pegmatite is a coarse-grained aggregate of albite-oligoclase, gray perthite, quartz, and muscovite, with minor biotite and apatite. In the lower levels of the most recent workings it is 3 to 7 ft thick and is locally rich in quartz along the footwall. In the old Burleson workings to the north it was 10 to 12 ft thick, with mica along both walls. The dike is bottomed in the northernmost workings at depths of 75 to 90 ft, but its keel was not encountered in any of the workings farther

south. Near the keel, which probably plunges gently south, its dip becomes relatively gentle. The known strike length of the dike, as exposed in the workings, is about 180 ft.

In the crosscut between the two shafts south of the road a pegmatite dike 18 to 27 in. thick is exposed. It lies parallel with and a few feet east of the main dike and consists of quartz, perthite, plagioclase, and a little muscovite. It cuts sharply across the country-rock structure on the hanging-wall side but is parallel with the foliation of the footwall gneiss and hence may have been injected along a fracture or fault. The country rock is a quartz-biotite-garnet gneiss that locally is rich in pyrite. Some layers have been markedly altered by pegmatitic and granitic material. The foliation trends nearly due west in road cuts east of the deposit, but it swings through northwest to north-northwest near the mine workings, where it dips steeply northeast. Most contacts between pegmatite and country rock in the mine workings are not parallel with the foliation.

The mica is clear, light cinnamon brown, and of excellent quality. It is flat and hard. The deposit is noted for its relatively high yield of large-sheet material. During the most recent operations in poorer parts of the dike, however, the maximum size of recovered books has been about 3 by 3 in. Cracks, ruling, clay staining, inclusions of apatite, and intergrowth of biotite are the principal imperfections. The mica concentrations are said to have been relatively lean near the surface. The richest part of the deposit, which was mined in the Burleson stopes, may plunge gently south. It may also taper distinctly in this direction, inasmuch as it was not encountered in the workings from the south shafts.

MAULDIN ROAD PROSPECT

A small prospect pit 50 ft east of a dirt road is 3.3 miles S. 30° E. of Thomaston (location 9, pl. 27). A pegmatite body at least 4 ft thick is exposed in this opening, which is 6 ft deep. Although no contacts can be seen, it appears to trend N. 45° E. A core of blocky perthite, which is 2½ ft thick, is flanked by a wall zone of granular quartz, decomposed feldspar, muscovite, and biotite. The muscovite is cinnamon brown, hard, flat, and generally in books 4 in. or less in diameter. It contains inclusions of quartz and intergrowths of biotite, and many books are badly cracked. The deposit does not appear to be of economic importance.

B. S. GIBSON PROSPECTS

The B. S. Gibson prospects are 3.1 miles S. 45° E. of Thomaston and 100 to 300 ft north of the Waymans-

ville road (location 14, pl. 27). They are in a field west of the home of B. S. Gibson, the owner. Several pits were dug in 1942 by H. H. Arnold. One group is 100 ft north of the road, and the other lies across a low mound farther north. All the pits have been refilled, but abundant pegmatitic float remains. This float material comprises blocks of massive quartz, weathered feldspar, muscovite, black tourmaline, and beryl. The beryl, which was found in the northern area only, is pale bluish green, and both it and the tourmaline appear to be associated with the massive quartz. The mica is light cinnamon brown, flat, and cracked. Some contains "A" structure. The 3-ft pegmatite body in the southern workings is reported to strike N. 40° E. and dip 78° NW. The northern body, which is reported to strike east and dip 66° S., is 2 ft thick. It is conformable with the foliation of the enclosing biotite gneiss.

A third pegmatite body was explored 300 ft west of the Gibson house by means of a pit and a 20-ft shaft with a short drift from the bottom. It strikes N. 55° E., dips 85° SE., and thins from 5 ft at the collar of the shaft to 3 ft at the bottom. Small pods of massive quartz form a discontinuous core. Most of the mica contains "A" structure.

EMMIT TRICE PROSPECT

The Emmit Trice prospect is about 75 ft south of the Triune Mills dirt road at a point 3.45 miles (by road) southeast of the Thomaston town square (location 15, pl. 27). It is owned by Emmit Trice, of Thomaston. The prospect appears to be of little commercial interest, inasmuch as a 16-ft shaft exposes only narrow pegmatite stringers that contain scattered books of cinnamon-brown muscovite 1½ in. or less in diameter. These stringers, which are in biotite schist, strike N. 56° E. and dip steeply northwest.

THOMPSON PROSPECT

The workings of the Thompson prospect are on both sides of a dirt road about 600 ft southeast of the Partridge mine (location 16, pl. 27). It is owned by E. M. Thompson. In 1942 C. M. Wacaster prospected the south end of the pegmatite body by driving a drift for a distance of 55 ft at a maximum depth of 25 ft; he is said to have obtained about 3 tons of mine-run mica. In this opening the body ranges in thickness from a few inches to 2½ ft, trends north, and dips steeply. In January 1944 a Mr. Bartlett, of North Carolina, exposed the deposit about 200 ft north of the Wacaster workings. He followed it northward for 25 ft in an open-cut and a shallow drift. Here the pegmatite is 6 ft thick and cuts sharply across the layering of the enclosing granitized

biotite gneiss. An 18-in. central quartz rib is flanked by mica-rich layers 6 in. thick. Beyond these are a wall zone of kaolinized feldspathic pegmatite that contains numerous small mica flakes and a mica-rich border zone 6 in. thick.

Most of the mica is green "A" material of poor quality. It is tangled, warped, clay-stained, ruled, and cracked. Some punch material could be trimmed from the flat portions of the books. A few small, flat, hard, clear books of cinnamon-brown mica were seen. These would yield punch and small-sheet stock. The proportion of mica in the 6-ft thickness of pegmatite is estimated to be 4 or 5 percent. Probably the recoverable punch and sheet material would represent 1 to 2 percent of the mine-run mica. The deposit can best be developed by extending the open-cut across the gently domed hill to the north.

PARTRIDGE MINE

The Partridge mine is on the north side of a dirt road 6.25 miles N. 15° W. of the Thomaston town square (location 17, pl. 27). It is owned by V. E. Thompson, of Meansville, who reports that it was first worked in 1914 and 1915 by N. L. Baxter. During this operation a shaft was sunk to a depth of 70 ft and some drifting and stoping were done near the bottom of the shaft. These old underground and surface workings have been filled and plowed over. In 1942 W. H. Sanders, of Thomaston, dug two open-cuts in the pegmatite west of the old workings, one to a depth of 30 ft and the other to 15 ft. Thompson states that about 2 tons of mine-run mica was recovered from these workings.

The only exposure of pegmatite on the property is in one of the Sanders cuts, where a 1-ft rib of quartz with a narrow selvage of kaolinized feldspar has been left as a pillar. It strikes N. 45° E. and dips steeply northwest. Most of the mica on the dumps is greenish "A" material that appears to have been associated with the quartz core. Many of the books are warped and tangled. A few small books of light cinnamon-brown mica also were seen. The quality of mica now exposed at the deposit is poor; some pockets of better mica occurred above the water table, but these probably have been mined out.

MAZE PROSPECTS

The Maze property is southeast of the Gatlin Church corner 6 miles S. 55° E. of the town square of Thomaston (location 24, pl. 27). The 110-acre tract is owned by James H. Maze, of Thomaston. The workings, which are about 500 ft southeast of the road, consist of a 4- to 9-ft deep trench that extends 35 ft along the

strike of the pegmatite, an incline down the dip of the pegmatite for 15 ft from the bottom of the trench, and a small pit 10 ft beyond the northern end of the trench (fig. 118).

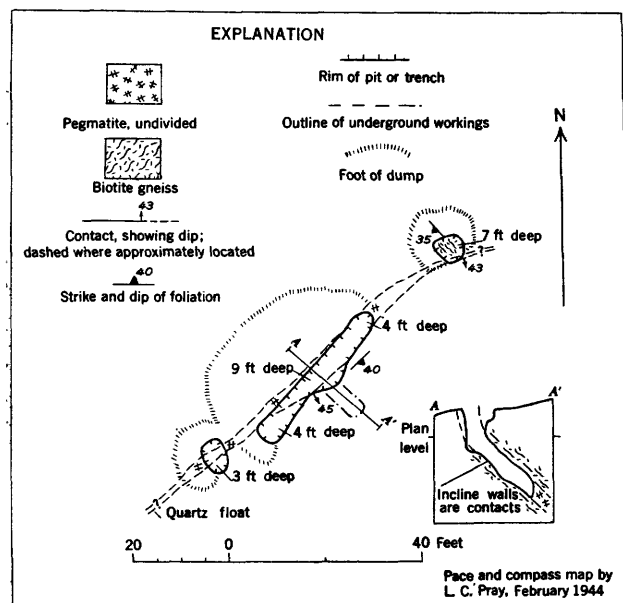


FIGURE 118.—Geologic map and section of the Maze No. 1 prospect, Upson County, Ga.

The pegmatite body strikes N. 40° to 75° E. and dips about 40° SE. Its average thickness in the trench and incline is about 4 ft, but it pinches to 1 ft in the pit. It widens to the southwest beyond the workings, where a thick core of quartz is present. In the incline the pegmatite consists of a discontinuous core of quartz lenses surrounded by a zone of intergrown perthite, plagioclase, quartz, and muscovite. The plagioclase has been completely decomposed, but the microcline is only partly kaolinized. No mica books more than an inch in diameter could be found in place, and the largest piece of scrap material on the dump is less than 3 in. in diameter. According to Maze, the larger books in the deposit are curved and marked by "A" structure. About 150 lb of mine-run mica was recovered from an estimated 20 tons of pegmatite mined in the incline.

About 600 ft southwest of this prospect are several 10-ft trenches. An 8-by-8 in. book of good-quality mica is reported to have been obtained from the southernmost trench, but no pegmatite could be seen at the time of examination. Water would interfere with further prospecting at this deposit, which lies in a creek bottom.

On a rounded hill about a quarter of a mile east of the trench and appended incline here described are numerous pits and trenches. The largest is about 20 ft deep. This property was worked for mica during World War I, but no pegmatite can be seen in place at the present time. The largest books on the dumps are 2 to 3 in. in diameter.

ATWATER MINE

The Atwater mine is 4.2 miles S. 37° E. of Thomaston, 0.6 mile north of the Atwater cemetery, and 400 ft east of a dirt road (location 10, pl. 27). It is said to have been opened during World War I by Martin and Frazee. J. E. Burleson leased the property about 1919 and operated the mine for 3 years. In 1942 the Asheville Mica Co., of Biltmore, N. C., sank shafts 1 and 2, but little mica was obtained. The workings comprise 11 shafts, all of which are caved or otherwise inaccessible, an open-cut 83 ft long, and 12 pits less than 10 ft deep. The series of openings trends N. 45° E. (fig. 119). A shallow shaft that lies 500 ft south of the mine appears to have been sunk in a separate body of pegmatite.

The country rock is a granitized biotite gneiss. Probably two or more pegmatite bodies have been mined in the main workings. They strike N. 45° E. and dip southeast. Both are poorly exposed, but the larger probably exceeds 10 ft in thickness. They are medium-grained aggregates of kaolinized feldspar (plagioclase?), quartz, and muscovite. Small lenses of milky white quartz occur locally. Most of the mica books that remain on the dumps are small. The mica is light cinnamon brown to brown, flat, hard, clear, and free splitting. The chief defects are quartz inclusions and cracks.

CORLEY MINE

The Corley mine is 4.25 miles S. 70° E. of the Thomaston town square and 200 ft south of the Triune Mills dirt road at a point near the bridge across the east branch of Swift Creek (location 19, pl. 27). It lies on land owned by C. R. Corley. Title to the mineral rights is claimed by Corley and by the heirs of J. E. Burleson. The mine was opened and reportedly worked to a depth of 20 or 25 ft by Burleson in 1920 and 1921. Except for a little digging by Corley, the property lay idle until January 1944, when the Burgess Mining Co., of Spruce Pine, N. C., leased and operated it for a period of 8 months. The workings consist of a caved incline, an open-cut, an area of stripping, and several trenches (fig. 120). The cut has been partly backfilled. Most

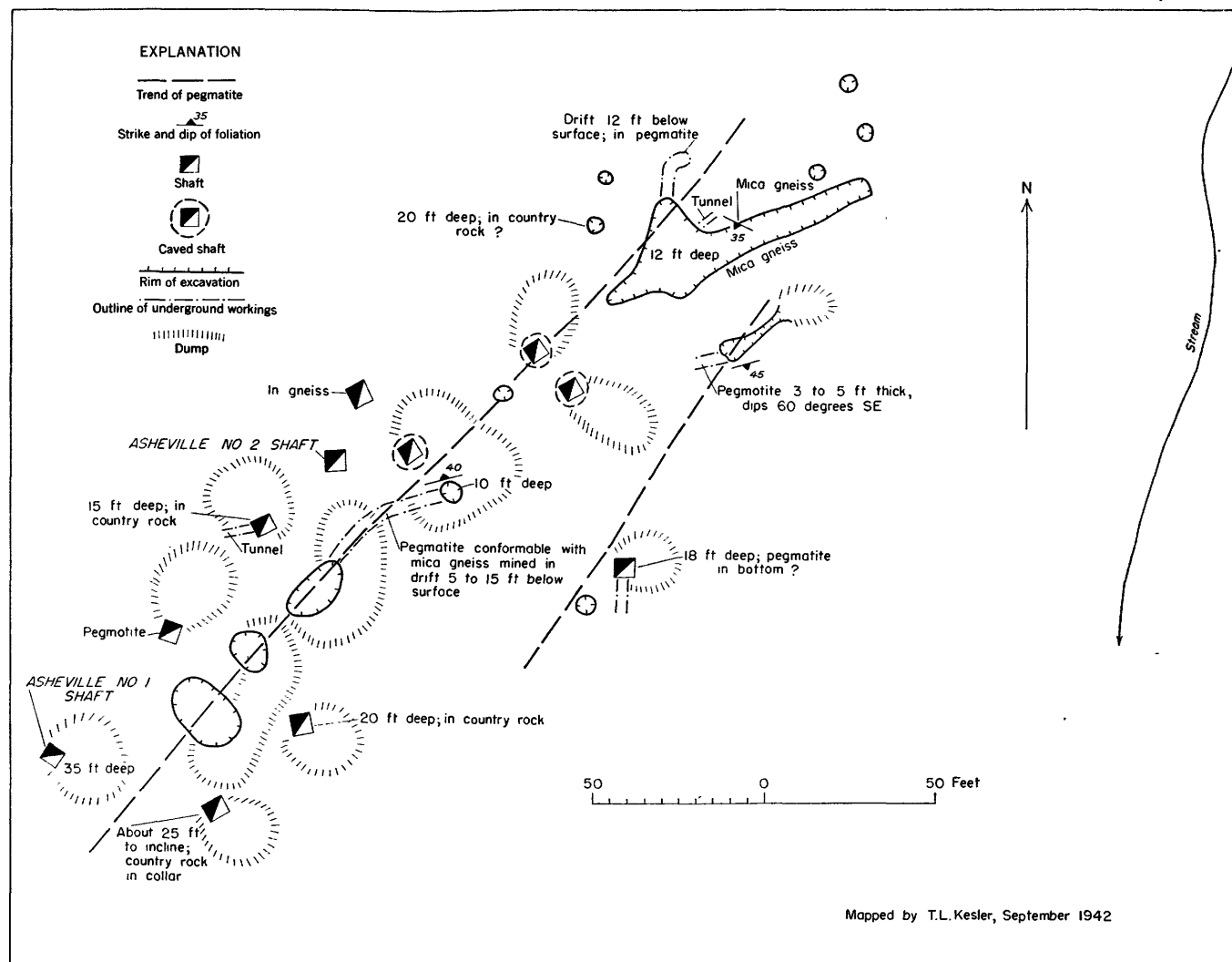


FIGURE 119.—Map of the Atwater mine, Upson County, Ga.

of these openings were made by the Burgess Mining Co.

The pegmatite body is trough-shaped. Two north-eastward-trending arms are separated by a central mass of gneiss. Toward the north this gneiss mass tapers, and the two limbs coalesce to form a blunt "nose" that is the surface expression of a plunging keel. All contacts dip toward the central gneiss mass; those on the western limb dip steeply, and those on the eastern limb dip moderately to steeply. It therefore appears that the pegmatite body is bottomed at relatively shallow depths (fig. 121) and that its keel plunges moderately to the southwest. The body is distinctly zoned, with a core of coarse, blocky perthite flanked by a medium-grained intergrowth of quartz, feldspar, and muscovite. A discontinuous wall zone of coarsely crystalline muscovite occurs on both sides of the eastern limb.

Mica is in books as much as 18 in. in diameter in the eastern limb, but only a small amount of coarsely

crystalline mica was observed in the western limb. The mineral is light pinkish buff and is cracked, wavy, and reeved. It is relatively abundant, but the percentage of sheet material in the mine-run mica probably is low. The size of the deposit, its state of decomposition, the relative abundance of mica, and the gently sloping terrain suggest the feasibility of further working the deposit by open-cut methods. A power shovel or drag-line scraper might well be satisfactory for a bulk operation.

CORLEY PROSPECTS

Several other pegmatite bodies have been prospected on the 86-acre Corley tract south and southwest of the Corley mine (location 20, pl. 27). Only one of the pits, however, exposes pegmatite that contains much coarse book mica. All the others expose only quartz-muscovite pegmatite (burr rock), feldspar-quartz pegmatite, and pegmatite that contains a little wedge-A mica.

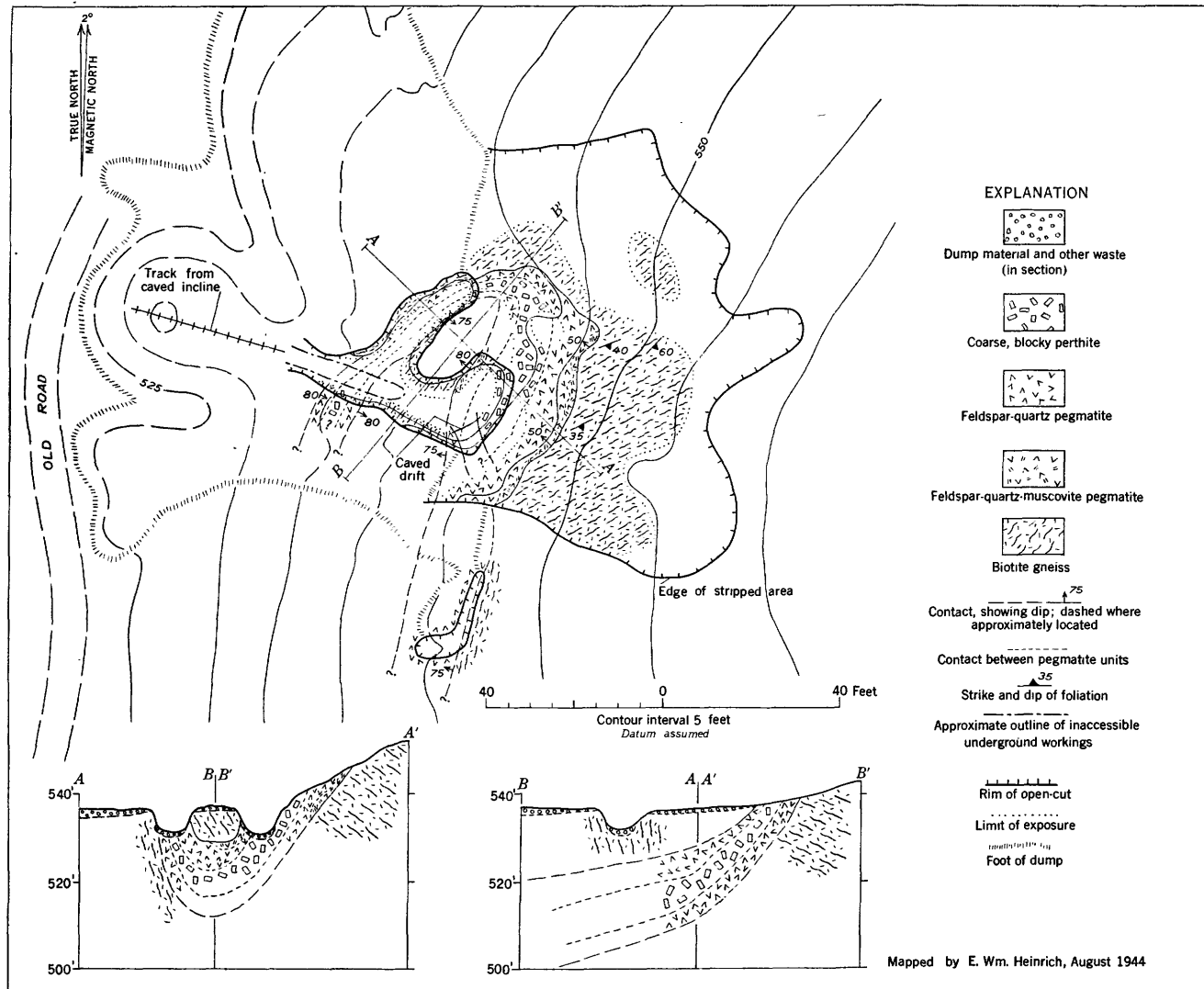


FIGURE 120.—Geologic map and sections of the Corley mine, Upson County, Ga.

Approximately 2,000 ft south-southwest of the Corley mine are two steeply dipping pegmatite bodies that strike N. 20° E. One of them, which is 1 to 2½ ft thick, has been explored by means of a 20-ft shaft and a glory hole that are connected by a 40-ft drift. Most of the muscovite occurs in relatively small, flat, lightly specked, ruled books. It is light brown, and a little of it is clear. Some books are curved and tangled, and a few contain biotite intergrowths. The other body, which has been explored by means of a 20-ft shaft, is about 5 ft thick and contains much coarse kaolinized microcline and biotite. A few small, flat, clear brown muscovite books were found in the dump material. It seems probable that in these deposits the content of muscovite in the rock is very low.

BARRON (BENNIE BARRON, WALKER WAKEFIELD) MINE

The Barron deposit is 5.6 miles S. 62° E. of the Thomaston town square and 0.4 mile north of Gatlin Church (location 22, pl. 27). The mine workings are immediately west of a dirt road that connects the Waymansville road with the Triune Mills road to the north. The mine is said to have been opened by Benjamin Barron and Mark Hancock in 1918; subsequently it was worked for several months by C. A. Nichols. J. E. Burleson obtained a lease in 1922 and began extensive operations that yielded substantial quantities of sheet and punch mica. After a bad cave-in in 1923 the mine was shut down, and it lay idle for 19 years. In 1942 Joseph Mayberry made an unsuccessful attempt to re-open it by means of a shaft. The Colonial Mica Cor-

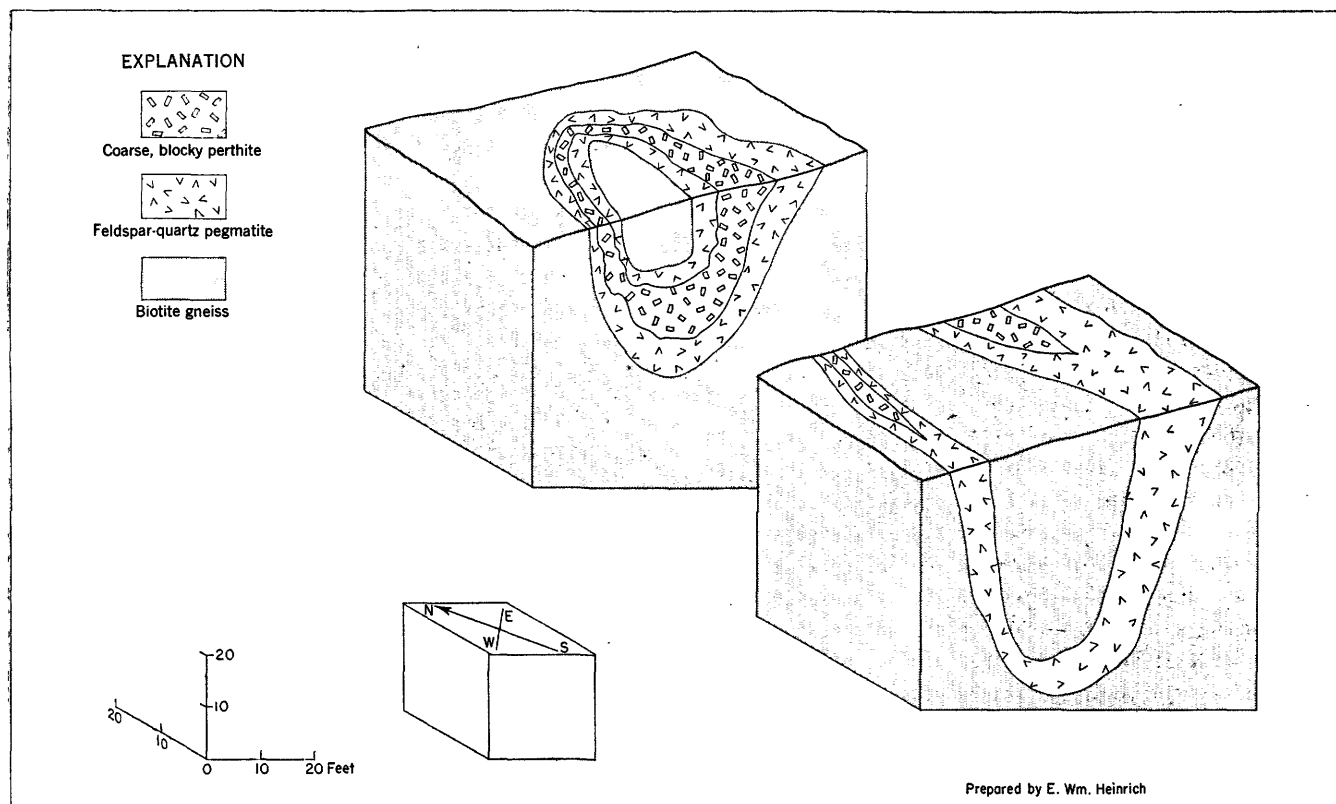


FIGURE 121.—Exploded isometric block diagram of the Corley pegmatite, Upson County, Ga.

poration secured title to the deposit in 1943 and leased it to the Burgess Mining Co., of Spruce Pine, N. C. Operations from September 1943 to September 1944 yielded little mica, and the mine was shut down.

The principal segment of the main pegmatite sill trends north-northeast for a known distance of 110 ft and dips very steeply west-northwest. It steepens with depth, passing through the vertical about 40 ft beneath the surface and dipping east below that level (see sections, pl. 30). It is 2 to 5 ft thick where exposed in shallow workings, but it is said to thicken somewhat between the 20- and 40-ft levels. At deeper levels it tapers and splits into a series of small lenses. As traced south-southwest, the main pegmatite body thickens and swings toward the west in a smooth arc. It extends at least 50 ft west-southwest beyond this bend.

Most of the country rock is a strongly foliated feldspathic quartz-biotite schist that contains many thin layers and lenses of granitic and pegmatitic material. Scattered through it without visibly consistent orientation are thick books of muscovite $\frac{1}{16}$ to $\frac{1}{4}$ in. in diameter. The schist is thoroughly weathered to a depth of about 50 ft. In the underground workings west of the pegmatite is an extremely hard, coarse-grained feldspar-quartz-garnet-pyroxene rock that contains small wisps of biotite schist. It is granitoid in texture but

faintly gneissic. In general the country-rock foliation is parallel with the walls of the pegmatite, and the foliation can be seen to curve markedly at the main bend in the deposit.

The large Burleson workings, most of which are now inaccessible, center around a 60- to 70-ft shaft that was sunk at the main bend in the pegmatite. Mica-bearing pegmatite is said to have been encountered from collar to bottom, and in this part of the deposit the pegmatite sill was 18 to 20 ft thick. Southwest of the shaft it thinned to 12 ft, and to the north-northeast it tapered even more rapidly. Mining was carried on in irregular stopes from the base of the shaft and from a short winze. "Clean-up" operations are said to have been started from the bottom of the deposit upward, but so few pillars were left that the workings caved before mining could be completed. Surface subsidence formed a nearly circular pit 60 ft in diameter and 30 ft in maximum depth (pl. 30).

In the northeast wall of the pit is a waste-filled drift that extends toward a smaller caved pit in the main segment of the pegmatite. Farther along the strike to the north-northeast are other surface openings and shallow drifts in which the pegmatite is 2 to 5 ft thick. A tunnel is said to have sloped south-southwest from a point at the east side of the road and to have connected

with a drift from the Burleson shaft at a depth of 25 ft. The main arm of the deposit is said to have been stoped for a distance of 150 ft from the shaft and to depths of 50 to 60 ft.

When Mayberry began operations in 1942, he avoided the old workings by sinking a shaft in wall rock 28 ft west of the pegmatite (pl. 30). This was abandoned at a depth of 35 ft. It was deepened, however, by the Burgess Mining Co. in 1943 and 1944. A crosscut driven eastward at the 54-ft level intersected old workings 20 ft from the shaft. At the 90-ft level a crosscut was driven east-southeast and southeast for 39 ft through garnet-pyroxene rock and feldspathic schist. A series of thin, mica-poor pegmatite lenses was then followed south-southwest for 43 ft. These lenses, which lay at the approximate projected position of the sill that was mined at shallower levels, seem best interpreted as the "roots" of this part of the deposit, especially as no other bodies of pegmatite were encountered in the workings or in exploratory drill holes driven east from the wall of the drift. The drift was continued beyond an abrupt bend in the pegmatite horizon, and a raise was driven upward into old workings from the Burleson shaft (pl. 30). A second raise was driven from a point about midway in the drift, and near its top an old fingerlike stope was encountered. Two thin masses of pegmatite, one of them rich in mica, appear to have been mined in this and adjacent old workings and may well represent additional "roots" of the main sill.

The pegmatite consists of oligoclase, coarse perthite, quartz, muscovite, and minor garnet and apatite. Both varieties of feldspar are kaolinized near the surface. The perthite appears to be more abundant in the interior parts of individual pegmatite bodies. Mica is most common along footwall contacts, but is said to have been scattered uniformly through the thickest and richest parts of the deposit. It is clear and light cinnamon brown. Large flat sheets are said to have been obtained, but most of the material now visible is badly clay-stained, cracked, warped, and tangled. A little burr rock, consisting of small but thick mica books scattered through massive quartz, is exposed near the northeast corner of the main pit.

Little mica was present in the thin pegmatite masses encountered in the most recent drift, but some was obtained from waste and pillars in the old workings. The mica-bearing material, which was made soft and relatively mobile by the abundant ground water that lies below the 30-ft level, was drawn off through one of the raises. For several weeks the waste averaged 5 lb of book mica per ton; it included several books 8 by 10 in. or larger. Much, if not all, of the deposit probably has

been worked out. The pegmatite sill, which splits into lenses and thin stringers downward and to the north-northeast, is effectively bottomed at about the level of the recent drift, so far as mining is concerned. The possible presence of unmined pegmatite southwest of the large caved area remains to be tested, but nothing is known concerning the amount of mica in this part of the deposit or the extent of old workings within it. Its exploration would involve the sinking of a new shaft or the extension of the most recent workings around the caved area.

BOYT MINE

The Boyt mine, 5.5 miles S. 56° E. of Thomaston (location 23, pl. 27), is near the top of a broad south-southeast slope at an altitude of 590 ft. The oldest workings were sunk by Will Johnson and Hubbard Martin, and mining on a somewhat larger scale was carried on by J. E. Burleson immediately thereafter, in 1918 and 1919. During this period five shallow pits were dug and larger slotlike cuts were opened to maximum depths of nearly 50 ft. Some underground stoping was done. The larger workings have caved to form irregular subsided areas (pl. 31). Production of mica is said to have been relatively small.

There are no outcrops on the property, which is covered by 10 ft or more of red clay. Pegmatite occurs in a dike that trends north-northwest, dips very steeply west-southwest, and is 8 to more than 12 ft thick. The country rock is quartz-biotite gneiss that is locally garnetiferous. Its foliation strikes northwest to west-northwest and dips north at moderate angles. In 1943 L. M. Johnson, of Barnesville, operated under lease from the Colonial Mica Corporation and sank a shaft in country rock west of the pegmatite. Ground water was encountered at a depth of 35 ft, and soft, decomposed pegmatite slumped in along the east side of the shaft at the 45-ft level. Because of difficulty in holding this soft material, Johnson timbered the bottom of the shaft, drove a short distance away from the dike, and crosscut back to the pegmatite in a northwesterly direction. Drifts north and south along the east margin of the dike were abandoned in January 1944, owing to sparseness of the mica to the south and difficult mining conditions to the north. Satisfactory concentrations of mica are said to be present in the north heading, but caving ground and a strong flow of water from older workings immediately above made further operation impracticable.

The most recent shaft, collared about 60 ft to the northwest, was sunk 60 ft in country rock, which was undecomposed and became very hard with depth. A crosscut driven east from its bottom passed through at least 12 ft of pegmatite. At this depth, estimated to

be 15 to 20 ft beneath the old workings, the pegmatite is hard and little weathered. Mica books are scattered through the rock, but their over-all concentration is so low that mining was not profitable. The mine has been idle since June 1944.

As exposed in the workings from the southeast shaft, the dike is distinctly zoned. A core of massive quartz that contains many small books of mica (burr rock) is flanked by 2 to 4 ft of coarse, blocky perthite and rudely formed graphic granite, and along the walls of the dike is coarse plagioclase-quartz-mica pegmatite. No quartz-rich core was encountered in the northwest workings, where the central part of the dike is characterized by a relatively high proportion of perthite and hence may be the intermediate zone. The richest concentrations of mica books are said to have occurred at the margins of the core. Minor concentrations are present along the walls of the dike, but elsewhere the books are sparsely scattered.

The mica obtained from recent operations is light to medium cinnamon brown and of fairly good quality. It is hard and occurs in books about 2 in. in average diameter. The maximum observed diameter is 7 in. Most of the material is flat but badly cracked. Warping, rippling, ruling, faintly developed "A" structure, inclusions of light-green apatite and dark-brown biotite, and long, thin muscovite crystals that "tie" the large books are less common imperfections. Much of the mica contains small inclusions of quartz and numerous but local brown and black spots and latticelike intergrowths of iron oxides. Although some high-quality material has been obtained from the deposit, the outlook for future operations is not especially promising. Little is known concerning the over-all structure of the pegmatite and the distribution of workable mica concentrations within it, and few of the past operations are said to have been profitable.

ZORN MINE

The Zorn mine is 5.8 miles southeast of Thomaston on the property of A. J. Zorn (location 29, pl. 27). The main openings, which were sunk by J. E. Burleson in 1922, are four shallow shafts distributed in a line that trends N. 60° E. North of the shafts is a pit 15 ft long and 5 ft deep that was dug by L. M. Johnson in 1928. There are no outcrops in the area, but much feldspathic garnet gneiss occurs as float immediately east of the workings. Both this rock and decomposed pegmatite are exposed in the shafts, where the gneissic structure strikes about N. 50° W.

The mica in the pegmatite is clear, light brown, and flat. It probably is not abundant, and most of the books are very small. Many quartz veins occur in the

vicinity of the mine, particularly to the west, and quartz fragments with one or more crystal faces are common near the outcrops of these veins.

YOUNG MINE

The Young mine is 4.7 miles southeast of Thomaston (location 30, pl. 27). It was opened in 1923 by Foe Corley, who sank shafts A and C in pegmatite. Minor prospecting was carried on in 1941. Shaft B, which intersected a 4- to 6-ft thickness of pegmatite at a depth of 15 ft, was sunk by M. S. Black in the spring of 1942. The irregular pegmatite body, which strikes east and dips north at a low angle (fig. 122), is exposed to a depth of 18 ft in shaft A.

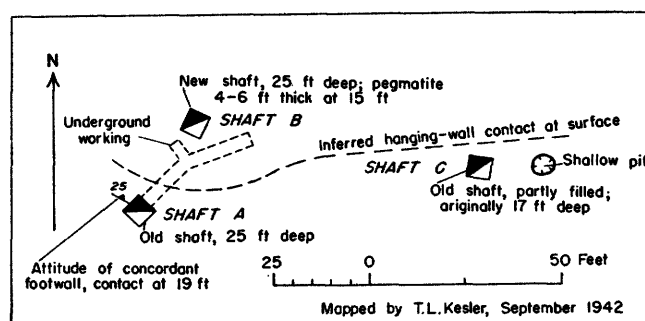


FIGURE 122.—Map of the Young mine, Upson County, Ga.

The crosscut from shaft A was driven northeastward in medium-grained, partly kaolinized pegmatite that contains a little small, clear, light-brown muscovite, much of which is badly hair-cracked. Coarse biotite, in part altered to vermiculite, also is present. The 17-ft shaft exposes pegmatite more than 8 ft thick. The new, or Black, shaft was sunk to intersect the thick body exposed in the drift, but only about 4 ft of pegmatite was found at a depth of 25 ft. The deposit probably does not warrant further exploration.

DUKE MINE

The Duke mine is 6.7 miles S. 62° E. of Thomaston and half a mile northeast of the Tobler Creek bridge (location 25, p. 27). The deposit is owned by Fred H. Duke and was opened in 1916 by R. L. Duke, who worked it for 2 years. C. E. Tucker, of New Hampshire, was the next operator, and in 1941 John Curry did a little prospecting. Good sheet mica valued at \$2,000 is said to have been recovered during these operations. L. M. Johnson worked the mine from April to June 1942, and in 1943 and 1944 Fred Duke sank several shafts. The openings consist of many small pits and cuts, as well as 16 shafts that range in depth from 7 to 55 ft (fig. 123). Most are now caved or otherwise inaccessible.

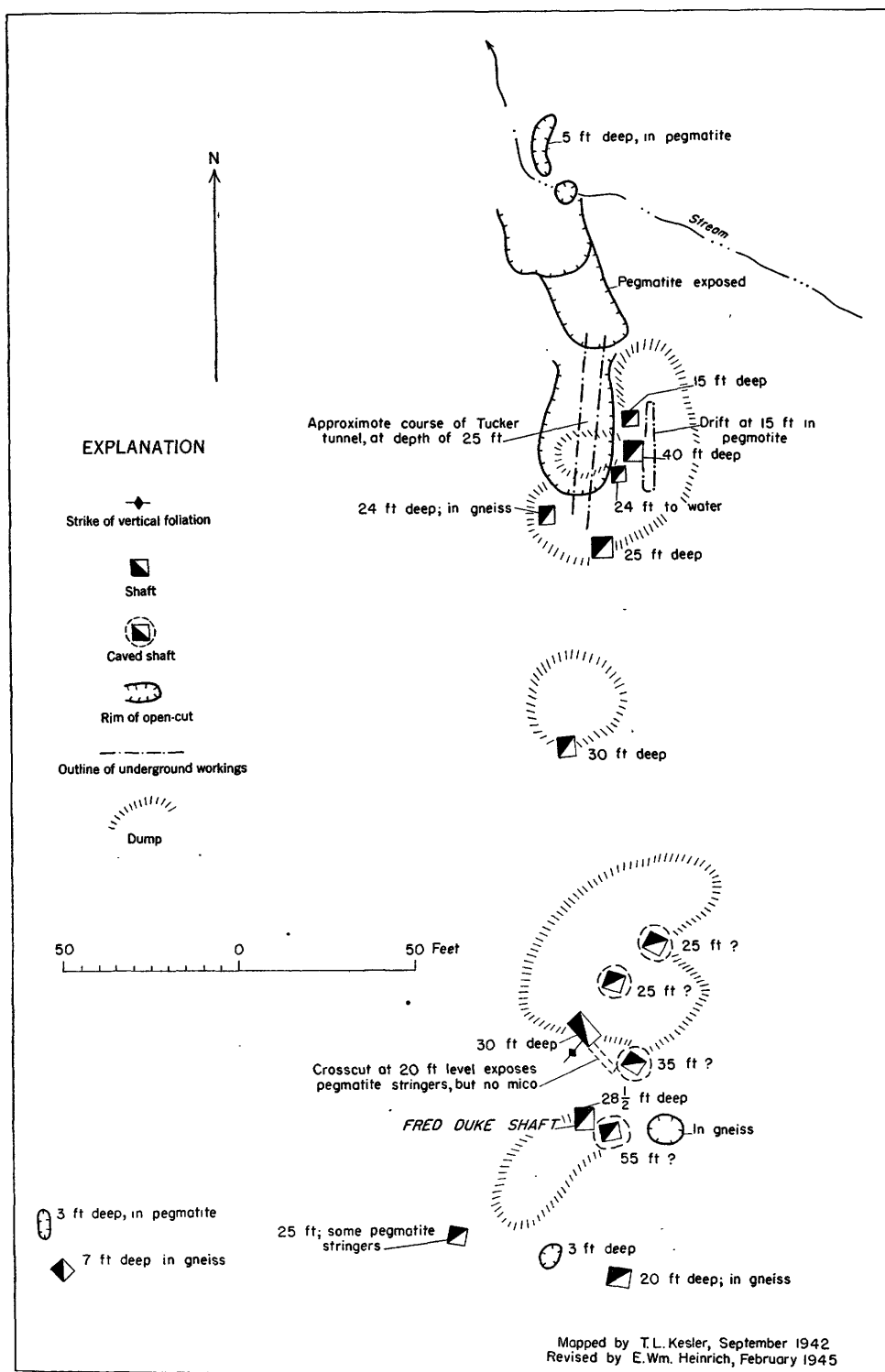


FIGURE 123.—Map of the Duke mine, Upson County, Ga.

The pegmatite is an irregular body that strikes a few degrees east of north and in general is vertical or dips steeply east. It reportedly ranges in thickness from 2 to 15 ft, and it contains many large, irregular inclusions

of biotite gneiss. A pophyses of pegmatite extend without consistent orientation into the country rock. The crest of the main body is exposed in the Fred Duke shaft, where it plunges 2° NNE. Beneath this crest the

pegmatite is 2 to 4 ft thick and is a rather homogeneous aggregate of kaolinized feldspar, muscovite, quartz, and biotite. Most of the larger mica books occur in scattered concentrations along the hanging-wall contact. The mica is light brown, and the books are generally small. Much of the material is badly cracked and warped, and inclusions of quartz and biotite are common. The irregularity of the pegmatite body and the scattering of the mica concentrations have made the deposit a difficult one to develop systematically. Each of the shafts was abandoned after a particular concentration was exhausted.

A second pegmatite body was prospected 155 ft S. 80° W. of the Fred Duke shaft. The mica is tied, contains "A" structure, and is clay-stained.

MITCHELL CREEK MINE

The Mitchell Creek mine is 7.25 miles S., 65° E. of Thomaston, and a mile northeast of Waymansville on a branch of Tobler Creek (location 26, pl. 27). The first prospecting was done late in 1942 by Lynn Thomas and Luther Johnson. S. P. Cronheim, of Atlanta, purchased the property from J. T. Mitchell in December 1942 and began mining by open-cut methods. The first lot of mica was sold in January 1943, and the mine continued in operation until November 1944. During this period it was one of the largest producers in the district. The deposit was diamond-drilled by the U. S. Bureau of Mines in April 1945.

Mining was done in hard rock in two open-cuts that were gradually enlarged and ultimately joined to form a single cut 200 ft long, 25 to 70 ft wide, and 60 ft in maximum depth (fig. 49, chapter A of this series). To the south are 10 prospect trenches, and in the west-central part of the area are two small caved pits (pl. 32). The deposit was discovered in a creek bed, and the water was diverted around the main workings through six separate drainage channels. The last two channels, completed in January 1944, are north and west of the main cut.

The country rock is a fine-grained quartz-biotite gneiss that contains varying amounts of pegmatitic and granitic material in the form of small pods, lenses, and stringers along the planes of foliation. Locally the permeation by pegmatitic solutions has been so thorough that a granitoid rock has been developed. It is gray, fine-grained, and very dense and consists of feldspar, quartz, garnet, and biotite. The country-rock alteration is greatest along the margins of the major pegmatite masses.

The gneiss has been folded into a series of anticlines and synclines that plunge 25° to 55° S. Their vertical axial planes trend north. Three major and several

minor folds are well exposed in the north drainage channel (pl. 32). The largest anticline is due north of the open-cut. Lenslike pegmatite bodies that are arcuate in plan occur at the crests of the anticlines. They conform to the country-rock structure and hence are typical phacoliths. The largest is 1.5 ft thick and 15 ft across its outcrop arc. In addition 1- to 2-in. stringers of quartz and pegmatite cut across the country-rock foliation and are parallel with the axial planes of the folds.

The crest of the main anticline, which was exposed at the north end of the cut late in 1943, plunges 30° S. Twenty feet to the south the fold is broken and passes southward into a prominent axial-plane fault. This structural break guided the emplacement of a large pegmatite dike, along whose margins the country rock was thoroughly impregnated with igneous material. On the east side of the main cut the foliation strikes uniformly north and dips moderately to steeply east, but on the west side the general strike is a few degrees north of west and the moderate to steep dip is south and south-southwest. The pegmatite body pinches out at several places in the floor of the cut, and the fault line is there marked by a 1- to 2-ft thickness of a granitoid hybrid rock.

Three structural types of pegmatite bodies are present: (1) conformable bodies, with an arch-like or inverted-trough shape, along the crests of unbroken folds in the country rock; (2) axial-plane dikes along breaks in the folds; (3) pegmatite sills along foliation planes in the country rock.

A large, curved pegmatite body was mined in the north end of the cut around the crest of the main unbroken fold. It was 16 ft in maximum thickness (on the east flank) and was separated from an underlying parallel but thinner pegmatite by 2 ft of gneiss. These bodies narrowed southward and joined the main axial-plane dike, which was 10 ft in maximum thickness and probably about 6 ft in average thickness in the upper parts of the cut. It thinned southward and with depth and is pinched out entirely at several places in the present floor of the cut. The dike is very irregular in detail and is marked by numerous branches, pinchings and swellings, and gneissic inclusions. Contacts with the country rock generally are gradational. Narrow pegmatite sills that dip steeply east are present along the east side of the open-cut. Their contacts with the gneiss are vague, but they probably pinch out southward. To the north they may well have been connected with the main phacolithic body.

Most of the pegmatite is a medium-grained intergrowth of perthite, plagioclase, and quartz, with scattered books of muscovite and biotite. Accessory min-

erals are apatite, tourmaline, garnet, and pyrite. The perthite, which is cream-colored and subtranslucent and has an unusually brilliant luster, appears to be more abundant than plagioclase. Both muscovite and biotite occur in well-developed crystals. Yellow-green to dark-green apatite, in crystals as much as 2 in. long and $\frac{1}{2}$ in. in diameter, is unusually abundant throughout the entire axial-plane dike.

Muscovite occurs in all three types of pegmatite bodies, but concentrations of commercial importance seem to be confined to the axial-plane dike, the highly pegmatitized gneiss that surrounds it, and the lower part of the main phacolithic mass. Little mica seems to occur in the lit-par-lit pegmatite sills. No localization within the main dike has been noted; the mica books occur throughout the entire mass, although they are sparse where the dike thins to the south.

The mica is light to medium cinnamon brown and generally occurs in well-formed crystals of hexagonal outline (fig. 26, chapter A of this series). The crystals are unusually flat, hard, and compact, and their color in a direction parallel to the cleavage planes is deep green. Muscovite-biotite intergrowths are common. Cross books of muscovite also occur but are rare. Inclusions of quartz and apatite are unusually abundant. Most of the apatite crystals are elongated either parallel or normal to the cleavage direction of the mica. Films of pyrite are locally included in otherwise clear books. Some books are cracked, and a few are lumpy or are marked by "A" structure. Their average diameter is 4 in. or less, but they yield a relatively high proportion of sheet and punch material.

The outlook for continued production of mica is not favorable. Most of the main trough-shaped, or phacolithic, pegmatite has been mined out. The main dike, from which the bulk of the mica has been taken, has thinned with depth and to the south as well. Diamond drilling has demonstrated that it does not persist far beneath the floor of the cut. The lit-par-lit pegmatite bodies do not appear to contain sufficient mica for commercial exploitation. About a thousand pounds of mine-run mica was obtained from one of these masses, but the material is said to have contained a high proportion of scrap.

JOE PERSONS MINE

The Joe Persons mine (location 27, pl. 27), which is 7.3 miles S. 76° E. of the Thomaston town square, is 0.2 mile by road beyond the Mitchell Creek workings and on the opposite side of the creek. The deposit was opened by Joe Persons during World War I, presumably in the vicinity of shaft A (fig. 124). This work was continued by James Howell and L. M. Johnson,

and in 1923 the deposit was leased to J. E. Burleson, who deepened the shaft to 45 ft and intersected pegmatite at about the 37-ft level. From the bottom of the shaft a 45° raise was driven to the surface (pit 1, fig. 124), and drifts were run northeast and southwest from points near the top of the raise. The southwest drift probably connects shafts B and C. Shaft D was later sunk to a depth of 20 ft.

Early in 1943 the deposit was leased to T. J. Stevenson, of Thomaston, who mined intermittently until October 1944. He operated in the workings from shaft A and later developed a 55° down-dip stope from shaft C. Pit 3 then was dug and a 35° down-dip stope was sunk to a depth of about 40 ft. Subsequently shaft E was sunk to a depth of 41 ft and drifts were extended northeast and southwest at the 37-ft level.

The pegmatite body, which is 6 in. to 6 ft thick, strikes N. 30° to 70° E. and dips moderately southeast. It is Y-shaped in section, and the junction of its branches plunges moderately southeast. The thickness increases with depth. In general the mass is conformable with the foliation of the biotite gneiss country rock. Near the pegmatite contacts the gneiss has been altered. The deposit has been explored for a strike distance of 150 ft and a vertical distance of about 50 ft. In general it is not conspicuously zoned and is a medium- to coarse-grained aggregate of quartz, plagioclase, blocky perthite, and graphic granite. Glassy pale-green apatite is a common minor constituent, and many small, rose-violet garnets occur near contacts with the country rock. In pit 3 a central gneiss septum is present in the pegmatite.

The richest concentrations of mica appear to occur in quartz-plagioclase pegmatite that locally contains pods of burr rock, or quartz with disseminated small mica books. The mica, which is light to medium brown, is relatively flat and hard. It is marred by throughgoing cracks, inclusions of quartz, and tied structure. Clay stains and slight warping are minor imperfections. In general the proportion of scrap to recoverable sheet material appears to be high. It seems likely that the last operation failed because of a scarcity of good-quality mica.

TOMLIN MINE

The Tomlin mine is 7.5 miles southwest of Yatesville (location 31, pl. 27) on property owned by Emmett Tomlin. It was opened in 1920 and worked for about a year by Willie Tomlin, who sank two 25-ft shafts. A pit, probably a caved shaft, lies to the north. The three openings intersected pegmatite which is no longer exposed. They are in a line that trends N. 15° E. and probably is the strike of the pegmatite body (fig. 125). West of these workings are a shallow pit and a 10-ft shaft. They expose mica gneiss whose foliation gen-

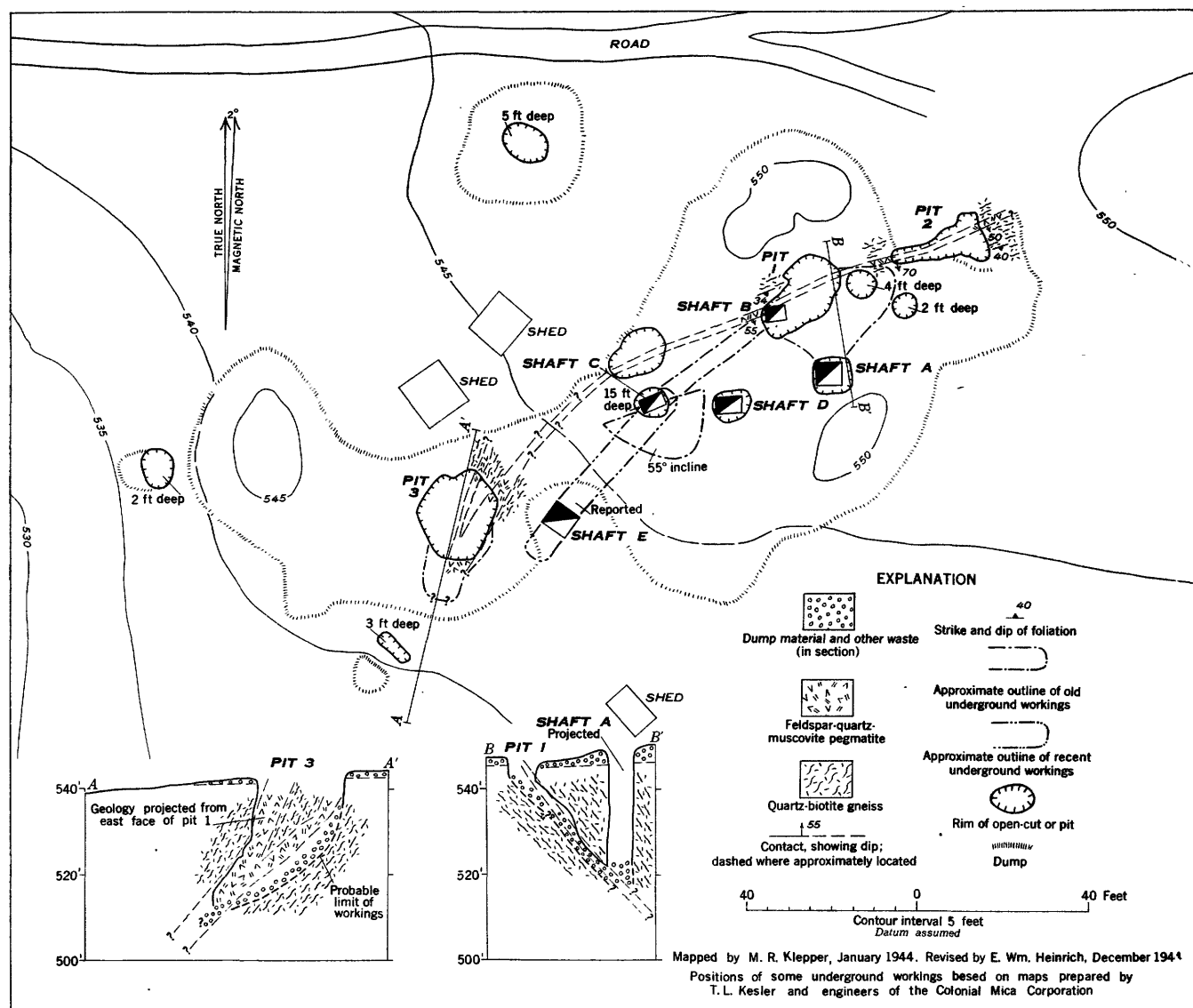


FIGURE 124.—Geologic map and sections of the Joe Persons mine, Upson County, Ga.

erally strikes east and dips 45° S. A crosscut was driven eastward from the shallow shaft in an attempt to intersect the pegmatite body mined in the east workings. All the dump material is thoroughly weathered. The few observable mica flakes are clear, light brown, and flat.

BLOUNT NO. 1 MINE

The Blount No. 1 mine is 5 miles east of Thomaston (location 32, pl. 27). The deposit, which is owned by Mrs. J. O. Blount, was worked by W. H. Partain, of Thomaston, from February to October 1944 and then by T. C. Woody, also of Thomaston, until early in March 1945. Operations were carried on for 60 ft down the dip of the pegmatite in a pit 23 by 23 ft in plan (fig. 126). Although neither contact is exposed near the bottom, most of the lower part of the pit appears

to be on the hanging-wall side of the deposit. The only other working, an old, partly filled shaft 30 ft south of the pit, was collared in gneiss but intersected the pegmatite body at depth.

The country rock is a coarse-grained, faintly foliated granitized gneiss that is thoroughly weathered near the surface. The tabular pegmatite body strikes $N. 20^{\circ} W.$ and dips $65^{\circ} WSW.$ The dip of the hanging wall probably flattens near the bottom of the cut, where the pegmatite thickens to at least 16 ft. At the top of the cut 8 ft of pegmatite is exposed (fig. 126).

Zones are well developed in the upper parts of the deposit. A core of coarse, blocky perthite with rods of massive quartz is flanked by medium-grained plagioclase-quartz pegmatite. Near the hanging wall the plagioclase is coarser and occurs in blocks 6 to 8 in. in

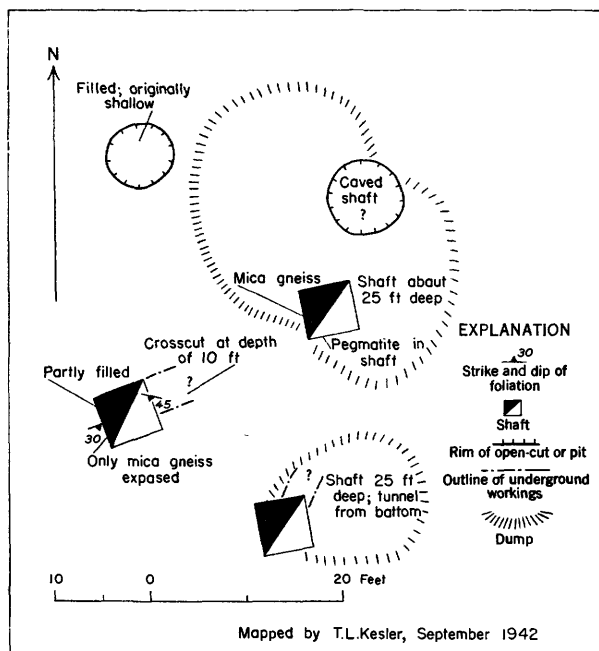


FIGURE 125.—Map of the Tomlin mine, Upson County, Ga.

diameter. Only one pegmatite unit is exposed near the pit floor; it consists of medium-grained plagioclase and quartz. Laths of biotite as much as a foot long are present in the feldspar. Accessory minerals are light-green apatite, black tourmaline, blue-green beryl, and garnet in small crystals. The beryl occurs in crystals as much as 4 in. long and 1½ in. in diameter and appears to be associated with the quartz pods.

Mica is most abundant in the plagioclase-rich pegmatite near wall-rock contacts. Thick books as large as 6 by 15 in. have been obtained. The mineral is light to medium brown, flat, and relatively free splitting. Greenish mottling, black specks, quartz inclusions, and cracks are common defects. Closely spaced ruling and "A" structure are less widespread. All the mining has been carried on along the hanging-wall side of the deposit, and little is known of the quality or quantity of mica along the footwall. The deposit offers some promise as a potential source of sheet mica and might well be mined along the strike at the level of the pit floor.

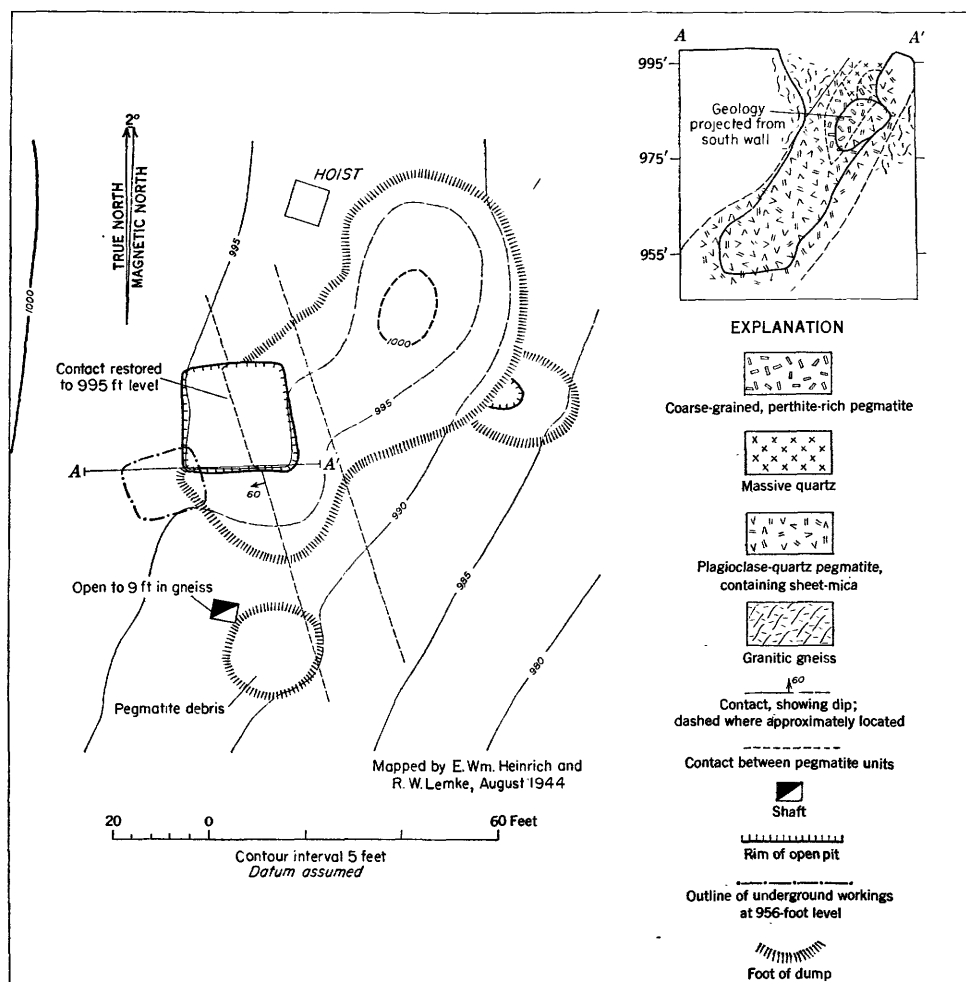


FIGURE 126.—Geologic map and section of the Blount No. 1 mine, Upson County, Ga.

PENNYMAN MINE

The Pennyman mine is 8.5 miles east-southeast of Thomaston (location 35, pl. 27). It was last operated from June to September 1944 by Walter Lewis in an

irregular pit 45 by 50 ft in plan and 18 ft deep. The other workings are three old shafts and several test pits (fig. 127). The maximum depth to which the deposit has been opened probably is less than 30 ft.

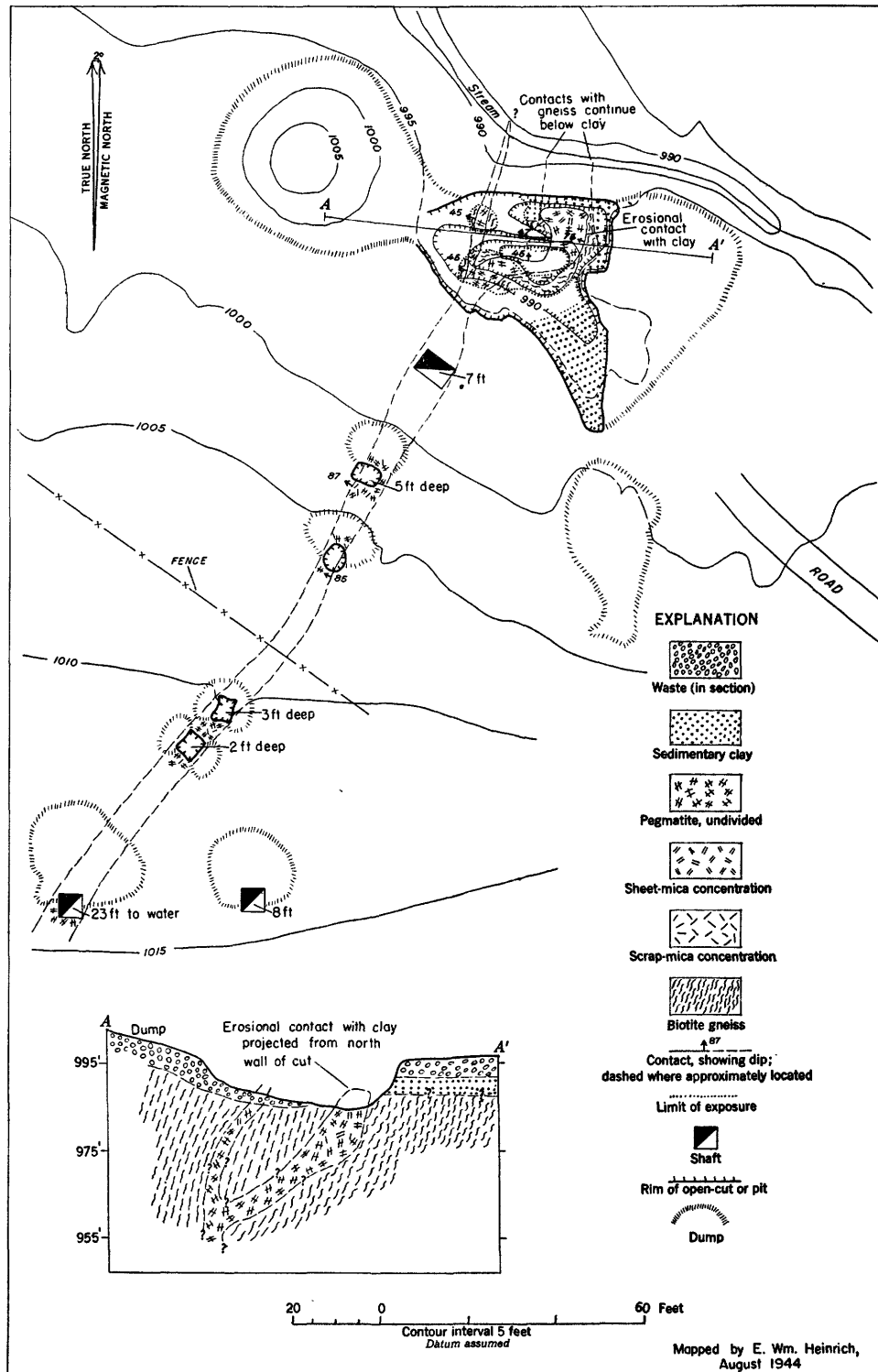


FIGURE 127.—Geologic map and section of the Pennyman mine, Upson County, Ga.

The biotite gneiss country rock is so thoroughly weathered that the attitude of its foliation cannot be accurately determined in the mine exposures. The pegmatite forms an irregular, lenticular body that trends northeast and dips moderately to steeply northwest. It is 4 to 10 ft thick in the test pits and shafts, and in the main pit it splits into two branches. The thicker branch swings abruptly to the east for 20 ft and continues in a northerly direction. The other branch is very poorly zoned and continues to the northeast. The body consists chiefly of intergrown kaolinized feldspar and quartz with scattered books of mica. In the open-cut pegmatite is overlain by as much as 8 ft of gray to black sandy clay. It probably continues to the northeast beneath the clay, which appears to have been deposited by the small stream north of the cut.

Book mica appears to be concentrated near the center of the thickest part of the deposit, or in the northeast corner of the cut. Books as much as 11 in. in diameter were observed, but the average size is 3 by 3 in. The mineral, which is light cinnamon brown to yellowish olive, is generally flat and relatively hard. Many of the books are lumpy and severely fractured. Minor defects are clay stains, quartz inclusions, and faint "A" structure. Nearly all the mica books in the pegmatite southwest of the open-cut are small and cracked, yielding material of scrap grade only. Owing to the scarcity of mica and the apparent pinching of the pegmatite body with depth, prospects for future production are poor.

SHORT-MITCHELL MINE

The Short-Mitchell mine is on the Henry Short property $3\frac{1}{2}$ miles south-southwest of Yatesville (location 36, pl. 27). It was opened early in 1942 by J. T. Mitchell and shortly thereafter was leased to M. S. Black, who continued the Mitchell shaft to a depth of 58 ft. Short drifts were driven north and south at the 40-ft level, the upper limit of ground water (fig 128). The pegmatite is an irregular sill that strikes due north and in general dips very steeply. Its thickness ranges from a few inches in the south drift to about 8 ft in the north drift. Both pegmatite and the gneiss country rock are thoroughly weathered. The pegmatite is a rather uniform, fine- to medium-grained aggregate of feldspar, quartz, muscovite, and biotite (partly altered to vermiculite). The muscovite is clear, light reddish brown, and free splitting. Many of the books are small, and most of the mined material was sold as punch, washer, and scrap.

UNNAMED PROSPECT

A prospect pit (location 37, pl. 27) 20 ft long, 8 ft wide, and 11 ft deep lies 200 ft west of the county dirt road about half a mile northeast of the Short-Mitchell

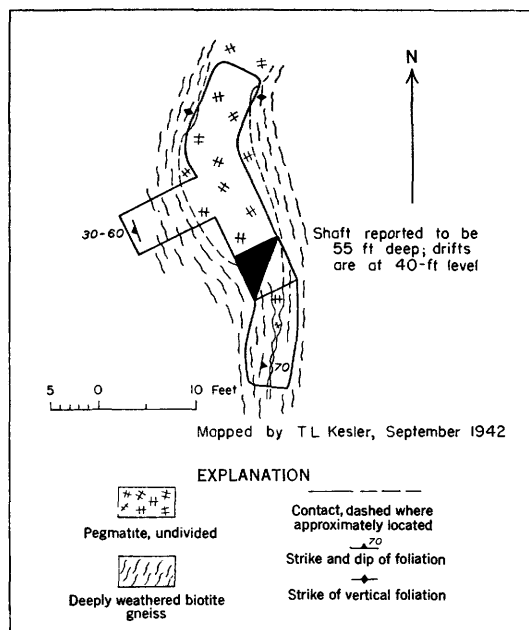


FIGURE 128.—Map of the 40-ft. level, Short-Mitchell mine, Upson County, Ga.

mine. It exposes a 4-ft pegmatite sill that strikes N. 10° E. and dips 82° E. in mica gneiss. A thin, discontinuous core of massive quartz is flanked by scattered, well-formed crystals of muscovite. The wall zone consists of medium-grained quartz-feldspar pegmatite that is partly decomposed. The mica, which is light cinnamon brown, is not very abundant, and the books are cracked and marred by quartz inclusions. Much of the mica is of scrap grade only.

CUNNINGHAM PROSPECT

The Cunningham prospect (location 38, pl. 27), which is owned by Clarissa Cunningham, of Thomas-ton, is 8 miles S. 71° E. of that town. During the fall of 1943 an 18-ft shaft was dug by the Woody Gap Mining Co., of Atlanta. About half a ton of mine-run mica is said to have been obtained before exploration was discontinued in December 1943, but no trimmed mica was sold.

The shaft is in kaolinized pegmatite to a depth of 9 ft, and its lower half is in decomposed biotite gneiss that is cut by small pegmatite offshoots from the essentially horizontal footwall of the overlying body. Near the collar the pegmatite is a rather homogeneous aggregate of kaolinized feldspar, quartz, and muscovite. Most of the mica on the dump is clay-stained greenish "A" material. A little punch might be trimmed from the larger books. The rest of the mica, which also is greenish, is flat, clear, and lightly clay-stained. It would yield punch and small sheets.

Several pits that are about 1,000 and 1,500 ft northwest of the main prospect have been sunk in or to mica-bearing pegmatite. These are now filled. The mica on the dumps, though soft and clay-stained, is flat and free from spots.

TRIUNE MILLS NO. 1 PROSPECT

The Triune Mills No. 1 prospect is 7.4 miles S. 75° E. of the Thomaston town square and lies along a branch road about 0.3 mile north of a point on the Triune Mills road 1 mile west of Logtown (location 33, pl. 27). It is on the E. W. Swift estate, a 1,300-acre tract that was leased in 1943 to T. J. Stevenson, of Thomaston. Stevenson sank a 15-ft shaft that intersected a steeply dipping 6-ft pegmatite body. The pegmatite is a relatively homogeneous aggregate of kaolinized feldspar and quartz. Muscovite occurs in layers or "streaks" that are more or less parallel with the walls of the body and appear to have been formed along fractures after most of the pegmatite had crystallized. The mica is cinnamon brown, specked, cracked, ruled, clay-stained, and marred by quartz inclusions. The largest observed books were 3 by 4 in. Most of the mica is of electric grade only, and there is little chance that further exploration would reveal material of better quality.

WATSON MINE

The Watson mine is 300 ft west of U. S. Highway 19 at a point 4.7 miles south of Thomaston (location 52, pl. 27). The workings are on land owned by Tom Watson and were dug by Oliver Howell during the period May-October 1944. They include a shaft, short drifts and stopes, and several shallow cuts and trenches (fig. 129). The three bodies of pegmatite that have been explored strike northeast and dip moderately to steeply southeast. The northwest body is poorly exposed in a very shallow trench. The southeast body, which is at least 6 ft thick, is a medium-grained aggregate of kaolinized feldspar, minor quartz, and sparsely scattered flakes of muscovite. The mica is warped and cracked.

The central, or main, pegmatite body is a lens 1 in. to 1½ ft thick. Its strike length is about 100 ft, and it has been explored to a depth of 30 ft. It appears to have been emplaced along a fault, for the foliation of the enclosing mica gneiss is concordant on the hanging-wall side and discordant along the footwall contact. On both sides of the body a 1- to 2-ft thickness of country rock has been recrystallized to form a coarse gneissic rock that consists almost wholly of tightly intergrown ¼- to 1-in. flakes of muscovite.

The pegmatite itself also is rich in muscovite, with minor quartz and decomposed feldspar. The mica, which is pale cinnamon brown, is cracked and warped. A moderate amount of good-quality sheet material has been obtained, but the average size of the sheets is small. The thinness of the pegmatite body makes mining difficult.

An old, shallow prospect pit lies 500 ft N. 57° W. of the mine. No pegmatite is exposed, but flat sheets of weathered and cracked mica as much as 6 in. across are present on the dump.

WHEELLESS MINE

The Wheelless mine is 7.5 miles S. 65° E. of the Thomaston town square (location 28, pl. 27). It can be reached from Logtown over about a mile of the dirt road to Waymansville and half a mile of a farm road and trail to the northwest. The property is owned by a Mr. Wheelless, of Thomaston, and was leased to the Woody Gap Mining Co., of Atlanta, until the end of 1943. The pegmatite body has been explored for a strike length of 100 ft by means of two shallow cross trenches, an 18-ft shaft, and a 15-ft drift from the bottom of the shaft. Walter Lewis, who obtained a lease early in 1944, sank a 12-ft shaft near the Woody Gap shaft.

The pegmatite body is vertical. The two trenches expose a central quartz mass 6 in. to 2 ft thick and a 3-ft wall zone of kaolinized feldspathic pegmatite. Very little mica was observed in the trenches or in dump material from them. The Woody Gap shaft, which is about 40 ft from the nearest trench, was sunk in decomposed feldspathic pegmatite. Small pockets of muscovite occur along the steeply dipping hanging-wall contact, and a discontinuous mica zone is reported to occur along the margins of a central quartz mass that was encountered near the bottom of the shaft. The mica is brown, curved, and ruled; more than half contains "A" structure. Some books are lightly specked and clay-stained. One 5-by-6-in. book was obtained from the Lewis shaft. The mine offers little promise as a source of sheet mica.

REYNOLDS MINE

The Reynolds mine is 2.6 miles west-southwest of Yatesville (location 43, pl. 27). The workings, chiefly shafts and pits, trend N. 40° W. for a distance of 275 ft. The mine, which is owned by the Reconstruction Finance Corporation and the Northwestern Bank, is said to have been opened by William Miller during World War I. In 1918 it was leased to J. E. Burleson, who operated it for about 2 years. The Asheville Mica Co., of Biltmore, N. C., sank a 38-ft shaft (shaft A) immediately northwest of three old pits (fig. 130) in

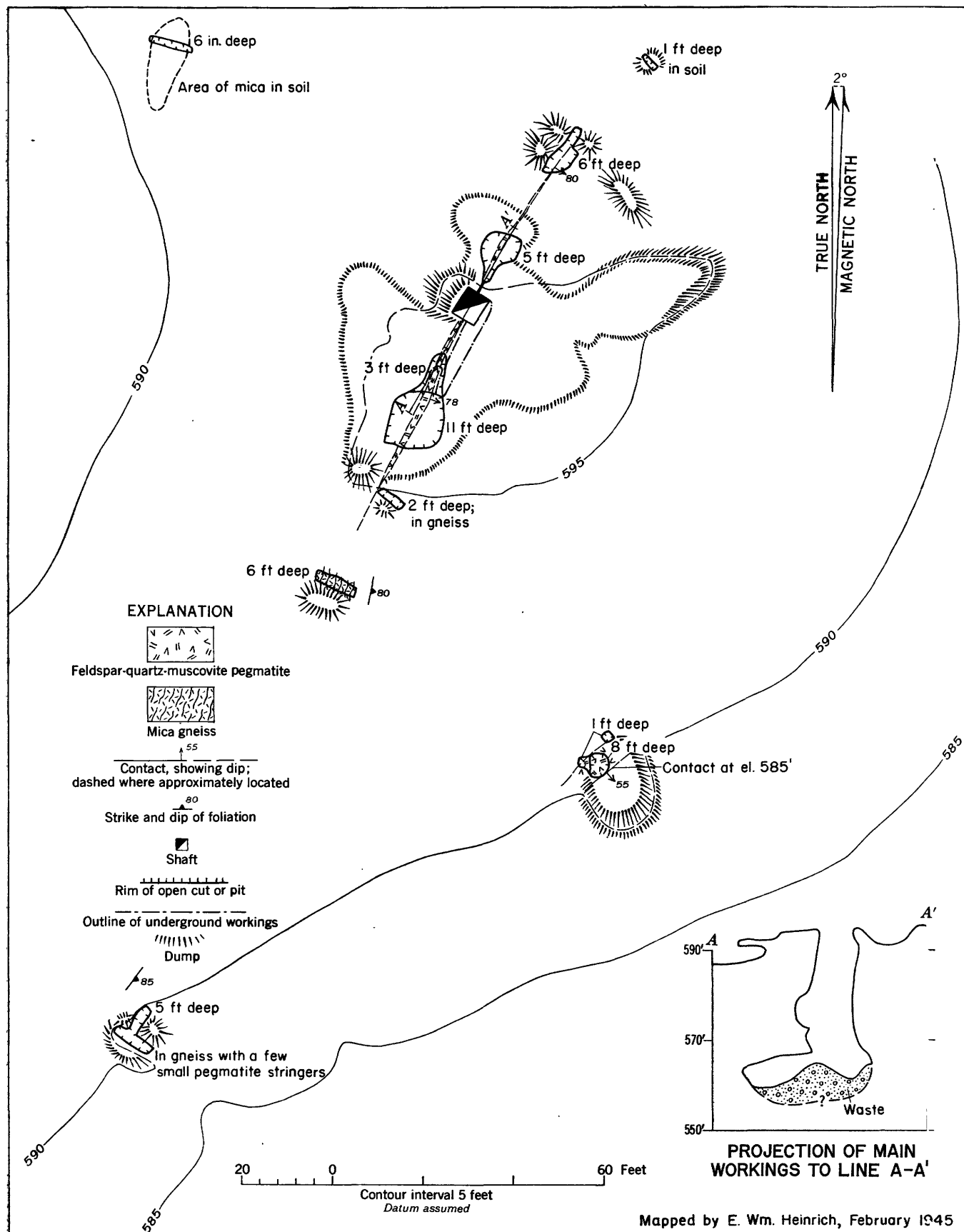


FIGURE 129.—Geologic map and section of the Watson mine, Upson County, Ga.

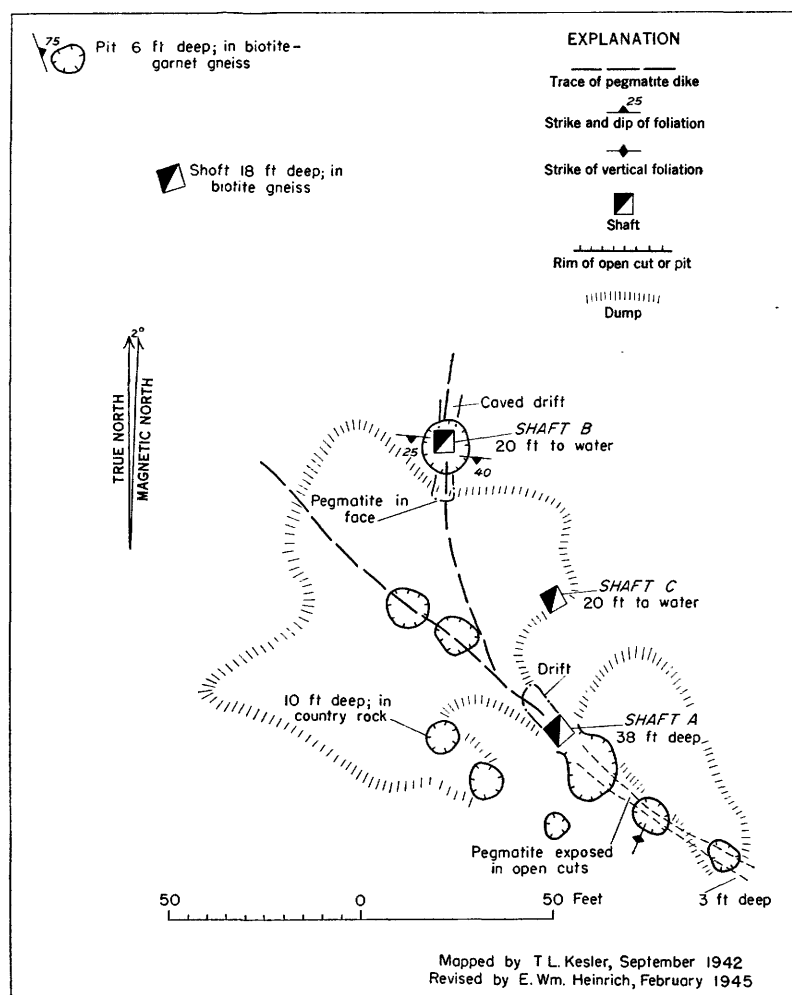


FIGURE 130.—Map of the Reynolds mine, Upson County, Ga.

1942 and worked the deposit late in 1943. Early in 1944 the mine was operated under lease by the Georgia Mica Co.

The pegmatite body strikes N. 45° W. and probably dips northeast. It cuts, at a high angle, the foliation of the mica gneiss wall rock, which strikes N. 85° W. and dips 25° to 40° S. in the central part of the mine area. Much of the gneiss has been invaded by stringers of pegmatitic material. Shaft B (fig. 130) was sunk on a 5-ft pegmatite body that trends north and may be a branch of the main mass. It also cuts across the country-rock foliation. The pegmatite is poorly exposed, but unweathered material that was encountered in shaft C indicates the presence of a coarse, perthite-rich core and a flanking wall zone of quartz-plagioclase-muscovite-biotite pegmatite in which black tourmaline is a common accessory mineral. Some of the perthite crystals have well-formed faces.

Two kinds of mica are present. Yellowish-olive "A" books, which may be associated with the core, are less

abundant than a hard, flat, light cinnamon-brown mica that occurs in the wall zone. Some of the flat books are cracked and ruled, and a few are tied. Mica appears to be abundant in the deposit, and further work may be warranted. A strong flow of water has been a serious problem in past mining operations.

About 700 ft southeast of the mine a 15-ft shaft has been sunk in a steeply dipping 4-ft pegmatite body. Only a few small books of light-brown mica are on the dumps.

STEVENS-ROCK (MARSHMAN, SULLIVAN, McKINNEY) MINE

The Stevens-Rock mine is in the northeastern part of Upson County 4 miles N. 67° W. of Yatesville (location 44, pl. 27). According to the local history, Indians first obtained mica from the deposit, but systematic mining did not begin until 1919, when Frank Boyd worked the southern pegmatite to a depth of 8 ft. Boyd's lease was purchased by J. E. Burleson, under

whose direction Oliver Howell worked the northern pegmatite (pl. 33) for several years. In 1942 the Asheville Mica Co., of Biltmore, N. C., unwatered the Boyd cut, but no mining was done. During April and May 1944 the Bob Lee Mining Co., of Atlanta, reopened the Howell cut. A little mining was done on the cut floor, but the operation proved unprofitable and was discontinued in July 1944. The deposit was owned in 1945 by the Colonial Mica Corporation. The U. S. Bureau of Mines explored it by means of diamond-drill holes in May 1945.

The Boyd cut is reported to be 35 ft deep, the east arm of the Howell cut 25 ft deep, and the west arm of the Howell cut 80 ft deep. A 25-ft drift is said to have been driven in a southerly direction from the bottom of the Howell cut (pl. 33). Owing to the dip of the west limb of the north pegmatite body, the southwest wall of the Howell cut is overhanging. All the cuts are in hard, unweathered rock and their walls are in good condition.

The country rock is a medium-grained garnetiferous gneiss whose foliation strikes northeast and dips very steeply. Two pegmatite bodies are present. The south body is exposed in the Boyd cut, where it strikes N. 65° E. and in general is vertical. It ranges in thickness from 3 to 6 ft and appears to be conformable with the country-rock foliation. It thins somewhat beyond the ends of the cut and is reported to thin downward and possibly to pinch out at the bottom of the cut.

The north pegmatite body, which was mined in the Howell cut, is L-shaped in plan. Its general form is that of an arch. The east limb strikes N. 45° E. and is vertical, whereas the west limb strikes N. 30° W. and dips steeply southwest. The axis of the arch crest, or line of junction of the two limbs, appears to plunge steeply south. The east limb is sill-like. At the bend in the pegmatite body the country-rock foliation likewise bends, or swings, toward the west. The foliation does not bend as far as the pegmatite body, however, so that the west limb is discordant. The average thickness of this part of the body is about 7 ft, and that of the concordant part is 5 ft. The length of the body, as measured along a line midway between its walls, is 115 ft.

The only accessible pegmatite exposure in the west limb is at the north end of the cut, where the rock is a homogeneous, medium-grained intergrowth of plagioclase and minor quartz and muscovite. The dump contains some coarse, blocky perthite, a few blocks of massive quartz, small flakes and books of muscovite, books of biotite as much as 2 by 3 in., granular aggregates of red garnet, a few fragments of pale greenish-blue beryl,

and a little pale-green apatite. The pegmatite of the eastern arm is similar in composition and texture, except that it contains accessory black tourmaline and is marked along its southeast wall by a thin, muscovite-rich rind. The south body contains quartz and feldspar in a medium-grained intergrowth, abundant black tourmaline, coarse reddish-brown garnet crystals, and books of muscovite as much as 1½ in. in diameter. Films and seams of bright-green sericite are common in the feldspars of both pegmatites.

The distribution of mica in the north pegmatite is little known. In the east limb a mica-rich zone appears to occur along the southeast contact, but it was mined to only a shallow depth and apparently is not of great economic significance. Little mica appears in the exposure of pegmatite at the north end of the cut, and the floor is said to be generally barren. The drift from the south end of the cut also is said to be in mica-poor pegmatite. These reports, and the shape of the western part of the cut, suggest that the mica occurs in a pipe-like shoot that rakes to the south. Nothing whatever is known concerning mica distribution in the south deposit.

The mica is light cinnamon brown and occurs in books as much as 8 in. in diameter. The average diameter of books on the dump, however, is 2½ in. Crystals and films of quartz, apatite, biotite, tourmaline, and pyrite occur in the mica, and hematite stains also are present. The books generally are hard and flat but badly broken. Reeves and "A" structure are minor defects. The output of trimmed mica from the mine is reported to have included much 6-by-8-in. material, and 840 lb of 4-by-6-in. sheets was sold in one transaction.

Very little mica was obtained during the operations of the Bob Lee Mining Co., and, according to W. E. Davis, of the Colonial Mica Corp., little is exposed in the faces and floors of the cuts. If the mica occurs in a pipelike shoot, the cut may well have been excavated beyond its keel and crest. Further exploration at depth should show whether the shoot also has pinched out in a down-plunge direction.

COLBERT (CASTLEN) MINE

The Colbert mine is 9 miles N. 65° E. of Thomaston and several hundred yards east of the tracks of the Southern Railroad (location 45, pl. 27). The mine is owned by Miss Sarah Colbert, of Atlanta. It is reported to have been opened shortly after World War I by John McDonald, acting for J. E. Burleson. Three pits (now filled) were sunk to depths of 15 to 20 ft. In 1943 Harrison W. Harp, of Thomaston, dug a small pit,

and early in 1944 the Woody Gap Mining Co., of Atlanta, started mining by open-cut and underground methods. The operations, which were continued until October 1944, included the sinking of shaft A (pl. 34) to a depth of 32 ft and drifting 20 ft northeast and southwest at the 25-ft level. Owing to heavy ground around the shaft, these workings were abandoned and shaft B was sunk to a depth of 35 ft. Drifts were driven southwest and northeast from its bottom. The shaft intersected the end of the northeast drift from shaft A. During the period of underground operations, three open-cuts were excavated by power-shovel methods (fig. 50, chapter A of this series). Late in September 1944 shaft C was sunk to a depth of 15 ft from the floor of cut 1, and the drift from shaft B was extended to connect with it. Shaft A and its southwest drift were removed during the excavation of cut 2.

The country rock is a deeply weathered biotite gneiss whose foliation trends northeast and dips moderately to steeply southeast. In cut 1 the pegmatite body appears to cut across the foliation at a small angle, but in the underground workings and in pit 2 it is concordant. It strikes N. 35° E. and dips about 75° SE. The known length of the body is 350 ft, and its vertical extent is at least 45 ft. In cut 1 it is 4 to 15 ft thick, but it thins appreciably to the southwest.

Several medial lenses of quartz occur in the northeast end of cut 1, and a zone of quartz and blocky perthite can be inferred on the basis of dump material from shaft C. The remainder of the deposit consists chiefly of kaolinized plagioclase, quartz, and mica, with minor black tourmaline. Beryl is reported.

Mica is moderately abundant, but many books are small and yield material of scrap grade only. The larger books, most of which were obtained from the southwest end of the open-cut and in the workings from shafts B and C, are 3 or 4 in. in average diameter. Two types of mica are present. One is hard, deep cinnamon brown, and relatively free from "A" structure, warping, cracks, and inclusions. Clay staining is not intense and generally can be eliminated by careful rifling. Ruling is a minor defect in some books. Full-trimmed 2-by-3-in. sheets were obtained, although the average size of trimmed sheets probably was less. This mica occurs throughout the medium-grained quartz-plagioclase wall zone. The other variety, which was mined in shaft C only, is soft, light yellowish-olive to green wedge-A material that contains tourmaline inclusions. It appears to be closely associated with the zone of quartz and blocky perthite.

The future of the deposit is uncertain. Rich concentrations of good-quality mica are reported to have been

mined in the southwest part of pit 1, but elsewhere the distribution of mica appears to have been spotty. The pegmatite is only a few feet thick at the southwest end of pit 2, and it may pinch out entirely farther southwest. Future operations might be directed to parts of the deposit beneath the 40-ft level, but heavy ground is to be anticipated.

HERRON MINE

The Herron mine is about a quarter of a mile east of the center of Yatesville and several hundred feet south of the Culloden highway (location 42, pl. 27). It is owned by Frank Herron and was operated by power-shovel methods late in the fall of 1944 by the Rutland Construction Co., of Atlanta. The main cut, which trends N. 18° E., is 150 ft long, 40 ft wide, and 22 ft deep at the north end. Three small trenches that expose only gneiss are 300 ft N. 10° E. of the cut.

The pegmatite body, which appears to be lenslike, probably strikes N. 18° E. and is vertical. The foliation of the enclosing biotite gneiss strikes northeast and dips 45° SE. Pegmatite is not exposed in the northeast face of the cut, and the southwestern 30 ft was dug in gneiss. Thus the lens is about 100 ft long. It may be about 12 ft in maximum thickness. A core of coarse, blocky perthite with small pods of massive quartz is indicated by dump material. Crystals of olive-green to light-blue beryl as much as 7 in. in diameter are associated with the quartz. Some of the material is glassy and of gem quality. The wall-zone pegmatite is a medium-grained intergrowth of quartz, kaolinized feldspar, muscovite, and black tourmaline.

Books of mica 7 in. or less in diameter are scattered sparsely throughout the wall zone. The mineral is hard, free splitting, and flat. It is light cinnamon brown to pale yellowish olive. The deposit probably has been mined out to a depth of 25 ft, and deeper exploration does not appear to be warranted.

JOHNSON MINE

The Johnson mine is 0.8 mile S. 8° E. of the center of Yatesville and a few hundred feet west of the dirt road that extends southeast from that town (location 40, pl. 27). It was operated during the summer of 1943 by W. E. Davis and during the fall of 1944 by the Rutland Construction Co., of Atlanta. Davis dug a series of shafts and connected them with drifts and stopes to a maximum depth of about 50 ft and over a strike distance of 100 ft. The Rutland Construction Co. excavated a power-shovel cut 200 ft long, 40 to 60 ft wide, and 25 to 30 ft deep. During this operation most of the Davis workings were destroyed (fig. 131).

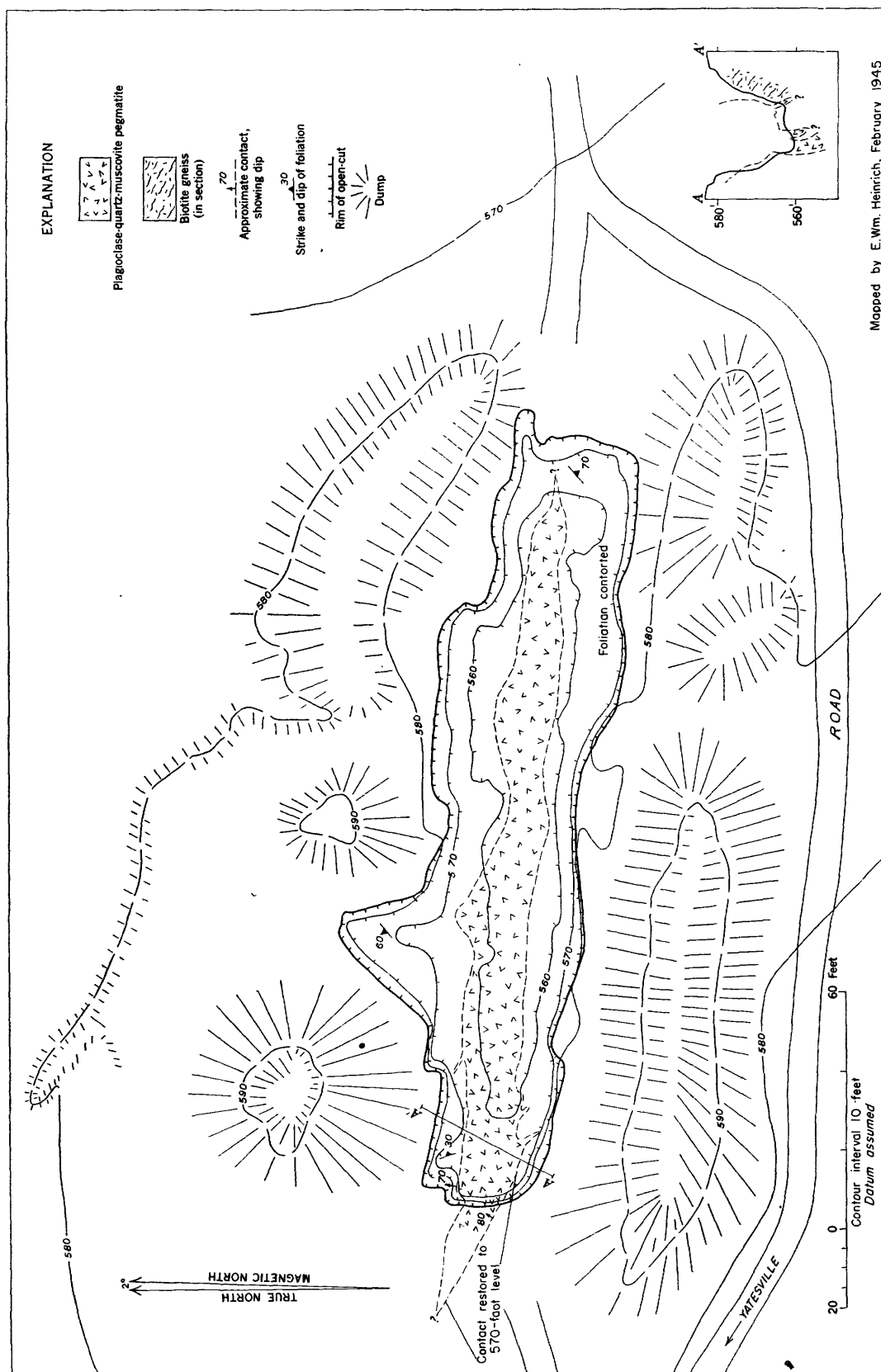


FIGURE 131.—Geologic map and section of the Johnson mine, Upson County, Ga.

The lenslike pegmatite body, which strikes N. 85° W. and dips steeply north, cuts across the foliation of the enclosing biotite gneiss. The foliation is highly contorted near the pegmatite contacts. On the footwall side at the west end of the cut it strikes N. 20° W. and dips 30° E., but on the hanging-wall side at the east end, near the point where the pegmatite pinches out, it strikes N. 45° E. and dips 70° SE. (fig. 131). Thus the pegmatite may have been emplaced along a fault. The exposed thickness of the pegmatite dike ranges from 4 to 7 ft, but near the center of the cut it may have been as much as 15 ft thick. Contacts with the country rock are very irregular, and blocks of partly altered gneiss occur within the pegmatite. Small tongues of pegmatite project into the wall rock.

On the west face of the cut the dike contains a 2-in. border zone that is rich in small muscovite foils and books, a 1- to 2-ft wall zone of medium-grained feldspar-muscovite-quartz pegmatite, and a central inclusion of gneiss flanked by a selvage of fine-grained pegmatite that is faintly foliated and appears to have been formed by alteration of the gneiss. As judged from dump material, the west part of the body contains a thin, discontinuous core of massive quartz and its east part a narrow (intermediate?) zone of blocky perthite. Locally, especially near the west end of the cut, the wall zone is rich in coarsely crystalline muscovite. Books as much as 6 in. in diameter and 5 in. thick were observed. Biotite is abundant in this zone near the east end of the body.

The dumps are rich in mica of good quality. Very little of the mica that was mined by power shovel was recovered. The books are flat, hard, free splitting, and light cinnamon brown. Some are cracked and clay-stained, and a few contain films of quartz and feldspar along cleavage planes. The best concentrations probably occur within 3 ft of the hanging-wall contact near the west end of the deposit. The deposit does not appear to be exhausted, but reopening of the mine might be difficult. The dumps may be worth reworking for sheet and punch mica.

WALKER PROSPECT

The Walker prospect is 2.2 airline miles north of Yatesville (location 48, pl. 27) and 75 ft west of the Yatesville-Barnesville road. It is reported to be on the Jack Walker estate and to have been first worked in 1942 by C. M. Wacaster. The workings consist of a pit 20 ft long, 7 ft wide, and 12 ft deep, with drifts that extend southeast and northwest from the bottom of the pit for distances of 5 ft and 10 ft, respectively. A little mining was done late in 1944.

The tabular pegmatite body, in biotite gneiss, strikes N. 50° W. and is vertical. The southeast drift exposes a 2½-ft thickness of pegmatite that consists of a poorly defined quartz core, 4 in. to 1 ft thick, and a wall zone of kaolinized feldspar and interstitial quartz. The pegmatite thickens to 7 ft in the northwest drift, where it contains a quartz rib 1 to 2½ ft thick that is flanked by kaolinized feldspar. At the portal of the drift the quartz rib lies near the southwest wall, but toward the northwest it swings to the center of the body and at the face is near the northeast wall.

Mica is moderately abundant, but most of the books are small and generally of poor quality. They are light cinnamon-brown, hard, and free splitting. The chief defects are intense buckling, cracks, and ruling. Concentrations of mica appear to occur along the margins of the quartz rib and along contacts with the gneiss.

ADAMS MINE

The Adams mine, 2.5 miles N. 3° E. of the main-highway railroad crossing at Yatesville (location 49, pl. 27), is owned by a Mr. Hager. It was first explored by Harvey Lyle and Calvin Battle, who are reported to have recovered a moderately large amount of mica. J. E. Burleson operated the mine from 1918 to 1920, C. M. Wacaster and B. M. Willis are reported to have operated it shortly thereafter, and in 1931 the Howell brothers did some mining. In 1940 H. E. Grindstaff mined in the southeast workings, and in 1941 L. M. Johnson sank shaft D (pl. 35) to a reported depth of 60 ft below the surface.

Between 1941 and March 1945 the deposit was worked intermittently by the Asheville Mica Co., of Biltmore, N. C. Shafts E and F were sunk to depths of 85 and 82 ft, respectively, and drifts were driven from both. Shaft G was sunk for ventilation and to facilitate the removal of waste from the drift from shaft F (pl. 35). Owing to heavy ground around an old shaft about 40 ft southeast of shaft G, the back of the drift collapsed, and most of the newer workings were filled with debris from overlying old stopes. When the mine was abandoned, the ingress of this material had not been checked.

The tabular pegmatite body lies in medium- to coarse-grained, biotite-rich granitic gneiss whose foliation strikes about N. 50° W. and dips 75° to 80° NE. The body ranges in thickness from 4 ft at the southeast end of the drift from shaft F to 8 ft in the northwest heading. It strikes nearly N. 45° W., dips 80° to 85° SW., and cuts across the country-rock foliation at a small angle. Its known strike length is 250 ft and its vertical extent is at least 85 ft. A perceptible thinning of the dike occurs near the southeast end of the most recent drift, but at the surface it does not begin to thin for at

least another 75 ft to the southeast. This suggests that the dike may plunge northwest.

The central part of the pegmatite consists of blocky perthite with lenses of massive gray quartz 1 to 3 ft thick and 5 to 10 ft long. The feldspar, which commonly occurs in well-formed crystals as much as 8 ft long, is buff-colored, unaltered, and relatively free from quartz. Some of the crystals are seamed with late-stage sugary albite. Dark-green to blue beryl crystals, $\frac{1}{2}$ to $1\frac{1}{2}$ in. in diameter and 3 to 15 in. long, occur sparingly in and around the quartz lenses. The very coarse grained pegmatite is flanked by a wall zone of medium-grained plagioclase-quartz pegmatite in which crystals of spessartite and small masses of pale-green apatite occur. A discontinuous selvage that is rich in scrap mica occurs along the walls.

Mica is moderately abundant in the wall zone and in the marginal parts of the core. Most of the books are 3 to 4 in. in diameter and about 1 in. thick, but books as much as 8 in. in diameter are not uncommon. The mica is brownish olive to cinnamon brown, flat, free splitting, and relatively hard. Fractures and hair cracks are the most common defects, and broad ruling, slight "A" structure, and biotite and quartz inclusions are minor imperfections. Near the surface the books are clay-stained, but below water level (about 30 ft) they are of good quality and yield a relatively high proportion of sheet mica.

The total amount of sheet mica obtained from the deposit has been relatively large, and additional masses of mica-bearing pegmatite appears to be present. Mica was moderately abundant along the entire length of the drift from shaft F. The block of ground beneath the drift and northwest of shaft G appears to offer the best possibilities for future mining. Some potash feldspar of fairly high grade probably could be produced as a byproduct.

KELLY O'NEAL PROSPECTS

The Kelly O'Neal prospects are in the northeast corner of Upson County (location 50, pl. 27). A 20-ft shaft was dug at the No. 5 prospect by W. P. Buckner, and all the other work was done in 1942 and 1943 by the O'Neal brothers. The property is owned by Kelly O'Neal. The No. 1 prospect, the southwesternmost of the group, consists of three pits (fig. 132) in a pegmatite sill that strikes north-northwest to north-northeast and dips west at high angles. It ranges in thickness from $1\frac{1}{2}$ ft in the south pit to 7 ft in the central and north pits. The pegmatite in the north pit is quartzose, especially near the hanging-wall contact. The wall zone contains quartz, perthite, muscovite, and biotite. In the south pit the sill strikes N. 15° W., dips 65° W.,

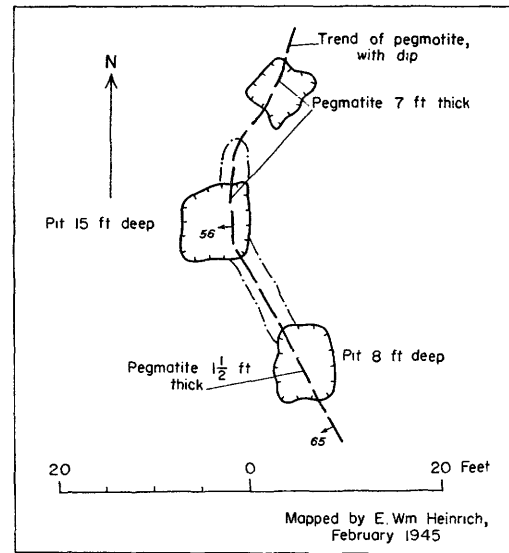


FIGURE 132.—Sketch map of the Kelly O'Neal No. 1 prospect, Upson County, Ga.

and consists chiefly of abundant small muscovite flakes and partly kaolinized perthite. Light-brown mica occurs along the quartz core in books 4 in. or less in diameter. It is weathered and cracked and contains inclusions of quartz and biotite. Much is of scrap grade only.

The No. 2 prospect lies 440 ft N. 70° E. of the No. 1 and consists of two shallow pits. The pegmatite body is not exposed, but the dump contains small blocks of quartz, decomposed feldspar, and abundant 2-in. books of light-brown mica that are flat but cracked. At the No. 3 prospect, which is 280 ft N. 60° E. of the No. 2 and 50 ft west of an old farm road, two pits have been sunk in a pegmatite body that strikes N. 35° E., dips 70° SE., and ranges in thickness from $1\frac{1}{2}$ ft in the south pit to $2\frac{1}{2}$ ft in the north pit. In the northern exposure the pegmatite consists chiefly of intergrown quartz and muscovite (burr-rock), but to the south much decomposed feldspar is present. Mica occurs in light-brown books 2 in. or less in diameter. It is ruled, cracked, clay-stained, and chiefly of scrap grade.

The No. 4 prospect consists of two small pits that are 330 ft N. 60° E. of the No. 3 prospect. The pegmatite contacts are not exposed, but the body is at least 4 ft thick. The core is a quartz pod 3 ft long and 1 ft thick. The dumps contain weathered plagioclase and books of mica $2\frac{1}{2}$ in. in maximum diameter. The mica, which is abundant along the margins of the quartz pod, is ruled and cracked but hard and flat. The No. 5 prospect, the largest of the group, is 120 ft N. 62° E. of the No. 4. It consists of several pits (fig. 133). The pegmatite body strikes N. 50° E., probably dips southeast, and is 20 ft thick. A core of massive white quartz 10 ft in

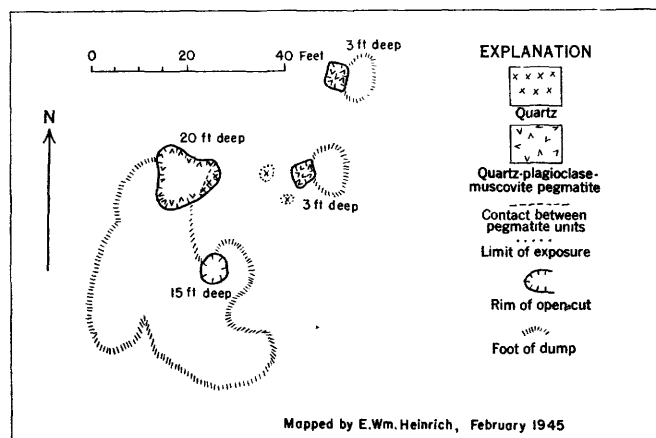


FIGURE 133.—Sketch map of the Kelly O'Neal No. 5 prospect, Upson County, Ga.

maximum thickness is flanked by a wall zone of quartz, decomposed feldspar, and muscovite. The mica does not appear to be very abundant. It is light brown and occurs as warped and cracked books 4 in. or less in diameter.

CARTER MINE

The Carter mine is in a field in the northeast corner of Upson County, 4.7 miles N. 8° E. of Yatesville (location 51, pl. 27). The property is owned by D. K. Carter, who with D. C. Smith prospected the deposit in 1941 and 1942 and recovered a small amount of mica. In March 1943 the mine was leased to the Georgia Mica Co., whose operations continued until November of the same year. Moderate quantities of good sheet mica were obtained.

The country rock is a coarsely crystalline mica gneiss in which layering is indistinct. In some places along contacts with pegmatite bodies this rock grades into quartz with disseminated muscovite (burr rock). The mine comprises two groups of workings. The northern workings are in a pegmatite body that is Y-shaped in plan, with a relatively thick western arm. The workings at *A* (fig. 134) include a shaft reported to be 40 ft deep, an irregular pit 4 to 13 ft deep, and a slope between the pit and the shaft along the steeply dipping footwall contact of the pegmatite. The hanging-wall contact, which is poorly exposed and irregular, probably was followed in the slope west of the pit.

The exposed pegmatite is a thoroughly weathered aggregate of kaolinized feldspar (probably both perthite and plagioclase), quartz, and muscovite. A prominent 1-ft mica-rich zone along the footwall of the body is preserved in the pillar above the stope. Small pockets of muscovite also occur in the walls of the stope, but most of the mica was obtained from the footwall zone. According to J. J. Egan, the pegmatite bottoms in the

workings and the keel of the body plunges gently south. The mica recovered from the workings below water level is said to have been light cinnamon brown, flat, hard, and clear. That remaining in the pillar would be of excellent quality if it were not clay-stained. It is flat and only slightly cracked. The largest book seen was 6 by 8 in.

The 9-ft shaft and the short drift at *B* (fig. 134) were excavated in the limb of the body that dips steeply west. It is about 5 ft thick and is a weathered aggregate of kaolinized plagioclase, perthite, quartz, and small mica flakes. At *C* (fig. 134) a 13-ft shaft and a short drift expose two pegmatites similar in composition, thickness, and attitude to the one at *B*. A small quartz lens and a few pockets of coarsely crystalline muscovite are present. A pegmatite body that dips steeply north has been opened by means of a 12-ft shaft and a short drift at *D* (fig. 134). It is 4 to 8 ft thick, cuts across the foliation of the enclosing gneiss, and contains abundant small mica flakes. Book muscovite occurs in small, irregularly distributed pockets, and a little biotite also is present. A few pounds of flat, clear, light cinnamon-brown mica was found on the dumps. The largest book is 6 by 6 in. The mica is of good quality but ruled and badly clay-stained.

Egan states that operations at the deposit were discontinued because of a heavy flow of water and the pinching out of the richest mica zone. The satisfactory quantity and quality of the mica mined from the workings at *A* (fig. 134) offer encouragement for additional prospecting in that area.

OTHER MINES AND PROSPECTS

The information in the following descriptions was obtained chiefly from the report by Furcron and Teague (1943):

T. J. Reeves prospect.—A 20-ft shaft was dug in 1940 on the T. J. Reeves property $4\frac{1}{4}$ miles S. 50° W. of Thomaston (location 6, pl. 27). The nearly vertical pegmatite body, which strikes N. 40° W. and is 2 ft thick, consists of kaolinized perthite, smoky quartz in small lenses, muscovite, and biotite. The muscovite is reddish-brown and is hard, clear, flat, and free splitting. Some of the near-surface mica is slightly clay-stained. Books 4 in. in diameter can be found.

King and Thurston mine.—Seven shafts 15 to 30 ft deep have been sunk in an area 50 by 80 ft on the old John Robbards place, 4 miles south of Thomaston (location 4, pl. 27). The mine, which is owned by Grant King and Hugh Thurston, of Thomaston, was opened in 1920 by Otis Franklin and a Mr. Johnston and was worked in 1930 by Paul Brown. The two northernmost

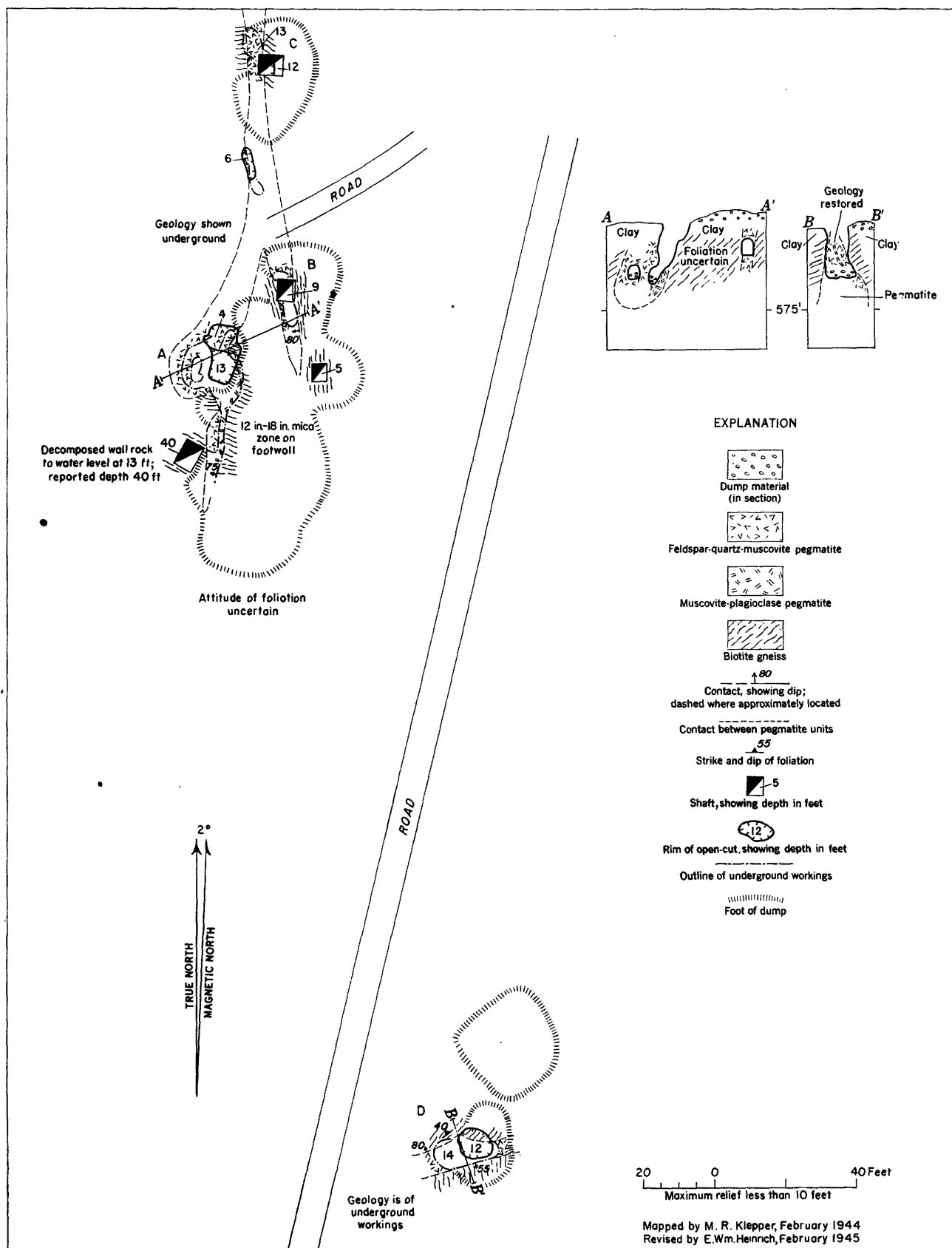


FIGURE 134.—Geologic map and sections of the Carter mine, Upson County, Ga.

shafts are in biotite gneiss, but pegmatite was intersected in three shafts to the east, as well as in a fourth shaft 15 ft farther southeast. The pegmatite sill strikes N. 30° E. and dips east-southeast in biotite gneiss. The dumps contain unweathered feldspar, smoky quartz nodules, muscovite, and biotite. The muscovite is reddish-brown, clear, flat, hard, and free splitting. Cracks and quartz inclusions are the chief defects.

Cumbe prospects.—Mica has been taken from several prospect openings on land owned by Mrs. Maggie Fossett Noll on the west side of the Thomaston-Butler highway 3.8 miles south of Thomaston (location 5, pl. 27). Small flakes of clear, light reddish-brown mica are in the dump from a 12-ft shaft 250 yd west of the Buford Jones tourist court. A quarter of a mile south of this opening a pit that was sunk by Mark Hancock exposes a 2-ft pegmatite body that strikes N. 52° E. and contains small, light-brown mica books. A 20-ft trench was dug 300 yd west of the pit by Joshua Slaughter. From this opening and a shallow pit 50 yd to the west a few small books of brown mica were obtained. A 40-ft shaft 70 yd north of the trench was sunk by Slaughter about 1935, and small mica books of good quality were recovered.

Three holes were dug between the Thomaston-Butler highway and the Talbotton road on the old Buckles property, now owned by Buford Jones. The pegmatite dike strikes N. 56° W. and dips 50° SSW. in biotite gneiss whose foliation strikes N. 55° E. and dips 50° SE. It contains small, hard, flat books of light reddish-brown to greenish-brown mica.

Joe McKinley prospect.—A small pit (location 7, pl. 27) was opened shortly after the close of World War I at a point 4½ airline miles S. 24° E. of Thomaston. The pegmatite body strikes N. 65° E., is 4 ft thick, and consists of central quartz lenses that are surrounded by a wall zone rich in kaolinized feldspar. Muscovite and biotite also are present. The muscovite, which occurs in books as large as 4 by 6 in., is hard, light reddish-brown, somewhat warped and cracked, and marred by traces of "A" structure.

F. E. Thompson prospect.—A 2-ft pegmatite body that strikes N. 28° E. and dips 65° ESE. is exposed in a small prospect pit an eighth of a mile due south of New Harmony Church and 3.8 airline miles S. 40° E. of Thomaston (location 11, pl. 27). It is 100 ft west of the New Harmony Church road. The mica occurs as rather small brown books in kaolinized feldspathic pegmatite.

L. M. Brooks prospect.—A little mica was obtained by the National Mica Co. in 1942 from a deposit on the L. M. Brooks property 3½ airline miles S. 40° E. of

Thomaston near a branch stream half a mile south of the Waymansville road (location 12, pl. 27). The main workings comprise a deep pit 15 ft in diameter, two tunnels that were driven east and one that was driven south from the pit at water level, an open-cut 20 ft long, and a 12-ft tunnel that connects the pit and cut. Twelve feet west of the main pit a crosscut that is 15 ft long and intersects an old shaft exposes two pegmatite dikes separated by about 10 ft of schist. They strike east, dip 40° S., and cut across the country-rock foliation, which strikes N. 50° E. and dips 50° to 70° SE. The pegmatite dike in the main pit is large, and its contacts with the surrounding fine-grained granitic gneiss are irregular. It consists of coarse feldspar, smoky quartz lenses, and muscovite. Only a little clear "A" mica can be found in and near the workings.

W. M. Dallas prospects.—A 12-ft prospect pit was dug in 1942 by S. P. Cronheim at a point 800 ft south of the road near the W. M. Dallas house and 2¾ airline miles S. 35° E. of Thomaston (location 13, pl. 27). An irregular 3- to 4-ft pegmatite body appears to be nearly horizontal in garnetiferous biotite gneiss whose foliation strikes N. 80° E. The pegmatite consists of coarse pink feldspar, smoky quartz, and abundant small books of cinnamon-brown mica. The mica is hard, flat, and free splitting. On the east side of the house a 15-ft pit exposes several small pegmatite stringers that dip about 75° E. The mica in them is reddish brown, hard, and flat but the books are very small.

About half a mile S. 25° W. of the Dallas residence are several other prospect pits. The eastern openings, which were last worked in 1942 by Mr. Cronheim, are on the north side of the road and occupy a northeastward-trending belt that is 400 ft long. The pegmatite body is 4 to 5 ft thick and appears to be conformable with the foliation in the enclosing mica schist, which strikes N. 47° E. and dips 60° SE. The pegmatite minerals are quartz, muscovite, biotite, and crystals of kaolinized feldspar as much as 6 in. across. The mica is brown, hard, and flat. Some books contain "A" structure, and others are lumpy. The largest observed books would yield 1½ by 2 in. trimmed sheets. Somewhat similar mica was obtained from a shaft sunk by Cronheim from a point about 500 ft to the west. No pegmatite is now exposed.

Bentley prospect.—Several small prospect pits were dug about 1928 on the J. W. Bentley property, 3¾ miles northeast of Thomaston (location 18, pl. 27). A thin pegmatite mass contains biotite and muscovite in crystals 1½ in. or less in diameter.

S. P. Cronheim prospect.—A little mica was obtained in 1943 by S. P. Cronheim from a 10-ft pit a quarter of a mile south of the Triune Mill road and 5.4 airline

miles S. 70° E. of Thomaston (location 21, pl. 27). A short drift extends north-northeast from the bottom of the pit. The workings expose a 4½-ft pegmatite mass that strikes N. 53° W. and dips 38° NE. in weathered mica schist. An 8-in. core is flanked by concentrations of greenish "A" mica. Brown mica, most of which is flat and clear, occurs along both contacts with the country rock. Some books are color-zoned.

Charlie Nims mine.—A cut about 40 ft long and as much as 25 ft deep was excavated in 1917 and 1918 by C. E. Sewell at a point 200 ft east of Israel Creek and 3.8 airline miles S. 46° W. of Yatesville (location 34, pl. 27). The pegmatite, which is poorly exposed, is enclosed by a granitized biotite gneiss whose foliation strikes east and dips 30° N. The body is 4 ft thick and irregular in shape and may strike about N. 80° W. (the trend of the trench). The pegmatite is a medium-grained aggregate of quartz, muscovite, kaolinized feldspar, and burr rock. A 10-ft pit, which was dug in the summer of 1942, exposes very coarse recrystallized mica schist with associated small pegmatite stringers. The mica is reddish-brown to brown, hard, flat, free splitting, and somewhat cracked; it contains inclusions of green apatite. Some books that would yield 2-by-2-in. sheets remain in the dump. About 250 ft N. 30° W. of the Nims residence 2- to 3-in. mica books associated with quartz and burr rock have been found in a field.

Helen McDonald prospect.—A pegmatite deposit was prospected in 1931 to a depth of 23 ft on property formerly owned by Helen McDonald, half a mile south of Yatesville (location 41, pl. 27). H. P. Edwards, of that town, is the present owner. The body is 5 ft thick, strikes N. 70° W., dips north-northeast, and contains a quartz core that is flanked by a mica-rich zone. The books are large, but the mica is cracked, warped, and marked by "A" structure.

Cliff Middlebrooks deposit.—A 4-ft pegmatite mass that strikes N. 52° E. and dips 83° NW. can be traced across a dirt road near the Cliff Middlebrooks residence between Yatesville and Topeka Junction (location 46, pl. 27). It contains very few small mica books.

J. M. Bevell deposit.—Sheets of mica several inches in diameter have been reported from a small area in the J. M. Bevell property, which is 1½ miles due north of The Rock on the Piedmont road (location 47, pl. 27).

Nottingham prospects.—Some prospecting has been done during recent years on the Nottingham property, 8.6 airline miles S. 20° E. of Thomaston (location 53, pl. 27). In the north prospect, which is 1.8 miles S. 50° W. of the junction between the Yatesville road and the Thomaston-Butler highway, a 3-ft pegmatite dike strikes N. 40° E. and dips southeast in biotite gneiss whose foliation strikes N. 80° E. and dips 39° S. The

pegmatite is a medium- to coarse-grained aggregate of quartz, feldspar, and minor muscovite. About 0.6 mile south of this prospect and 200 ft east of Tobler Creek a small pit exposes an irregular pegmatite body that strikes N. 35° E. and dips 67° SE. It ranges in thickness from 6 in. to 4½ ft and is enclosed by a granitized biotite gneiss whose foliation strikes N. 40° E. and dips 65° SE. It consists of perthite, smoky quartz, and muscovite. The mica is hard and brown but is badly cracked, ruled, and warped. Much of it is loc'y.

D. C. Ellerbee prospect.—Books of badly ruled mica 3 in. or less in diameter were obtained from a prospect on the west side of Hendricks Road 2 miles southwest of Crest (location 54, pl. 27). A shallow pit 15 ft long was dug in 1917. The dump consists chiefly of quartz with disseminated small books of mica (burr rock).

LAMAR COUNTY

COGGINS PROSPECT

The Coggins prospect (location 55, pl. 27) is 3.5 miles northwest of Milner and a quarter of a mile west of U. S. Highway 41 on land formerly owned by Doc Irwin and recently sold to a Mr. Coggins. It is one of the few prospects on the north side of the major thrust fault in the district. The workings consist of three small pits in a line that trends northeast. From the largest, which is 10 ft deep, a 12-ft drift extends southwest.

The pegmatite body strikes N. 30° E. and dips 75° to 80° WNW. It is at least 5 ft thick, but the footwall is not exposed. In the central pit it is split into a 2-ft eastern branch and a somewhat thicker western branch by a septum of mica gneiss. The pegmatite is a rather homogeneous medium-grained aggregate of quartz, feldspar, and muscovite. The mica, which seems to be relatively abundant along the hanging-wall side of the body, is cinnamon brown and is ruled, cracked, and reeved. Books as much as 3 in. across were noted. Owing to the low over-all concentration and the general poor quality of the mica, further prospecting does not appear to be warranted.

TAYLOR PROSPECT

The Taylor prospect (location 57, pl. 27) is 6.1 miles N. 10° E. of Barnesville and can be reached from that town over Georgia Highway 72 to Liberty Hill and east and south over farm roads for about 2 miles. The property was leased early in 1944 to Clay A. Cheek, of Griffin, who exposed an irregular pegmatite body to a depth of 15 ft in a narrow open-cut 30 ft long. At the north end of the cut the body is tabular and dips about 60° E. in a partly granitized biotite gneiss. It is said to be less than a foot thick in the cut floor, and at the south end

of the cut it appears to pinch out. A narrow offshoot, however, may continue to the south.

Most of the pegmatite is an aggregate of kaolinized feldspar, quartz, and a little muscovite. A lens of quartz 18 in. thick is exposed in the north wall of the cut and is flanked by a discontinuous mica-rich zone. Most of the mica is tangled and warped yellowish-olive "A" material.

Four shallow pits have been dug in mica-rich schist about 1,000 yd south of the main prospect. Only a few narrow stringers of barren pegmatite have been exposed. Several 1-by-2-in. books of greenish "A" mica were found in the dump.

HOWARD MINE

The Howard mine (location 58, pl. 27), which is 1.6 miles N. 10° E. of the Barnesville town square, was leased to John W. Walker, of Macon, for a short period during 1943. A pegmatite sill, which is exposed in a 20-ft shaft and a 10-ft drift from the bottom of the shaft, dips 30° N. in quartz-mica gneiss. It is at least 6 ft thick.

The lowest exposure is the upper part of a central quartz mass that is overlain by a 2- to 3-ft zone rich in small mica flakes. Near the hanging wall most of the pegmatite is an aggregate of quartz, kaolinized plagioclase, small muscovite books, and small blocks of kaolinized perthite. All the mica is soft and badly warped, tangled, and ruled. It is yellowish olive. Some occurs in "streaks" near the margins of the quartz mass. Little sheet mica appears to be obtainable from the deposit.

EARLY VAUGHN MINE

The Early Vaughn mine (location 61, pl. 27), which is 3.9 miles southeast of Barnesville, was one of the most important sources of sheet and punch mica in the district from March 1942 until mid-1944. The deposit was opened by Early Vaughn during World War I and was further prospected by J. E. Burleson in 1918. It then lay idle until 1938, when Gary Goggans dug a narrow trench to a maximum depth of 18 ft. A little work was done by Vaughn in 1939, and the property was leased to L. M. Johnson early in 1941. The main opening was lengthened and deepened until March 1942, when the deposit was sold to the Meyer and Brown Corp., of New York City. Johnson states that he produced 60 tons of mine-run mica during his operations. According to Ray Ward, manager for the Meyer and Brown Corp., 128 tons of mine-run mica was obtained during the most recent operations. The deposit was diamond-drilled by the U. S. Bureau of Mines in May 1945.

The tabular pegmatite body splits downward into two "roots" and was mined in a cut 85 ft long and 8 ft wide.

This opening was extended downward and westward as an inclined underground stope, and by 1942 most of it was 60 to 70 ft deep. A narrow branch stope along the west-wall mica zone rakes north to a reported depth of 90 ft (pl. 36). This branch stope was then continued to the southeast around an abrupt right-angle bend in the hanging-wall contact, and on the 81-ft level a junction was made with the east-wall workings to form an opening about 25 ft wide (September 1943). Except for a large quartz pillar the rock between the two stopes was then mined away to form a single stope that was bottomed in gneiss at a depth of 95 ft. From September 1943 to January 1944 operations were confined to the east-wall zone near the south end of the mine, where a heading was driven northward at a depth of 40 ft. Much exploratory work was done in an effort to find the downward continuation of the pegmatite. Waste rock from mining operations at higher levels was allowed to accumulate in the deepest stope, whose floor is now covered by 15 to 25 ft of this material. Diamond drilling by the U. S. Bureau of Mines, however, has confirmed the reports that the deposit was bottomed in this stope.

Near the surface the pegmatite body is tabular in form, but with depth it becomes complicated by branches, protuberances, and exceedingly abrupt variations in thickness. The range in thickness is from 3 to 24 ft, and where it is thickest the pegmatite contains a massive quartz core as much as 10 ft thick. This quartz lens thins toward the surface. Much of the early mining was done between the quartz and the hanging-wall contact; the richest part of the deposit evidently was at a depth of 50 to 70 ft, where the quartz is thickest. In cross section the south part of the pegmatite body is like an inverted Y. The stem of the Y is the trace of a steeply dipping tabular body that forks downward into two arms at a depth of 60 ft. The thin west arm pinches out in the bottom of the deep stope, and its keel plunges northward at a low angle as far as an abrupt bend in the west wall at the north end of the stope. The east arm is 2 to 10 ft thick, and its line of junction with the west arm pitches north at a low angle.

Two principal and one subordinate mica concentrations have been mined. The west-wall shoot, which was followed along the wall from the surface to the deepest part of the mine, was persistent and contained mica of the best quality. The east-wall shoot was worked chiefly in the deeper part of the mine. The subordinate mica shoot, which lay near the thickest part of the quartz mass and below the junction of the two arms of the deposit, is reported to have been a foot or two thick and about 8 ft in height and to have plunged north at an angle of 15°. In it the mica books were clustered near

the west wall of the east arm of the pegmatite body. Where the two arms joined near the thick quartz mass this shoot arched over toward the west and joined the west-wall mica shoot (pl. 36).

The pegmatite body in the north half of the mine is relatively thin and tabular near the surface but thickens to 24 ft near the bottom of the stope. In the north wall of this stope, the body pinches abruptly to 8 ft and extends northward as a relatively fine grained aggregate of quartz, scattered small mica flakes, plagioclase, and perthite. Little coarse mica is present in this rock. Throughout the entire deposit, northward-plunging structures are characteristic. These include the central quartz mass, the keels of both arms of the pegmatite body, the crest of the irregular gneiss septum that separates the two arms, and the richest mica shoots. In general the deposit strikes N. 30° E. and dips west-northwest. It cuts across the steeply dipping layers of the enclosing biotite gneiss at angles of 10° to 15°. The gneiss in the lower levels of the deposit is partly granitized, and its foliation is contorted. In the trench south of the open-cut the pegmatite is only 3 to 6 in. thick. The foliation along the west wall is parallel with the contacts, but along the east side it swings from a northwest strike to one nearly parallel with the walls, possibly owing to drag. Thus this part of the pegmatite may have been emplaced along a fault.

The pegmatite consists of quartz, plagioclase, muscovite, minor perthite, and a little black tourmaline, garnet, apatite, pyrite, and beryl. Some of the quartz and perthite occur in subgraphic intergrowths. Much of the plagioclase is dark green. Pyrite occurs chiefly along fractures in massive quartz. The mica is light pinkish buff, but a few books are greenish and have brownish borders. In general the quality is very good, and the material is flat, hard, and free splitting. Cracks are the chief defect, and a few books are lumpy. Others contain minute, widely scattered black specks. The mine-run mica has yielded about 6 percent trimmed punch and sheet, 26 percent untrimmed punch, 12 percent washer, and 56 percent scrap. In general the books are rather small, and the ratio of trimmed punch to trimmed sheet is 9:1. Nearly 88 percent of the trimmed sheets were in the 1½-by-2-in. and 2-by-3-in. size categories. The remainder included sheets as large as 4 by 6 in.

Both arms of the thicker part of the deposit have been mined out, and the simpler tabular sections of the body were found to contain insufficient mica for commercial operation. The deposit therefore appears to have been nearly exhausted. The workings are partly filled with water and debris, so that reopening of the

mine for further prospecting and development would involve considerable expense.

MEANS PROSPECT

The Means prospect is 3.9 miles S. 63° E. of Barnesville and about 400 ft southwest of the Early Vaughn mine (location 62, pl. 27). It is owned by William Means, who lives nearby. The pegmatite body lies along the projected strike of the Early Vaughn pegmatite, but the two are not connected (pl. 36). It is exposed in two shallow shafts, one sunk by Means and the other by the Meyer and Brown Corp. The attitude of the pegmatite body is irregular, and its thickness is variable. The wall rock is decomposed biotite gneiss.

The pegmatite consists of perthite, quartz, black tourmaline, and greenish "A" mica. The mica is associated with a quartz core that is exposed in the bottom of the north shaft. A little plagioclase and a few small books of brown mica were found on the dumps. Some sheet mica is said to have been recovered during the operations, but none is now visible in the workings or the dumps.

J. T. MEANS MINE

The J. T. Means mine (location 64, pl. 27) is in southeastern Lamar County 7.2 miles S. 40° E. of Barnesville and half a mile southwest of Ramah Church. It is owned by H. S. Worsham, of Forsyth, and was operated in 1918 by J. E. Burleson. Later, until 1929, mining was carried on intermittently by Lambert and Phinazee. The larger, or southeastern, opening, which is 25 ft long, 4 to 8 ft wide, and 12 ft deep, was formed by the merging of two pits. A remnant of the partition between them remains as a pillar. The wall rock is mica gneiss whose foliation strikes east and dips 20° S. The pegmatite dike strikes N. 20° E., dips 75° E., and ranges in thickness from 4 to 8 ft. Its crest, which is exposed 8 ft beneath the rim of the south pit, plunges southwest at a moderate angle.

The pegmatite is an aggregate of unweathered feldspar and quartz in which 1- to 2-ft pods of massive white quartz occur. Small flakes of muscovite are scattered through the quartz-feldspar rock, and black tourmaline and biotite are accessory minerals. Crystals of glassy, bluish-green beryl as much as 2 in. in diameter are associated with the quartz pods. The mica is bright yellowish-olive flat-A material. Most of the larger books are associated with the quartz pods; some are said to have weighed as much as 75 lb. Small, ruled books of clear, light cinnamon brown mica also are present.

The smaller open-cut, which lies 300 ft N. 80° W. of the main cut, is 15 ft long, 8 ft wide, and partly filled with waste. A short drift extends to the south. The

pegmatite sill, 3 to 4 ft thick, strikes N. 10° E. and dips 35° W. It contains a 2- to 12-in. smoky quartz rib that is fringed by coarsely crystalline muscovite. The wall zone consists of medium-grained feldspar-quartz pegmatite with accessory biotite and tourmaline. The mica is light yellowish olive and occurs in "A" books as much as 5 in. in diameter.

Fifty feet northeast of the pit is an area rich in muscovite and biotite float.

SUGAR HILL PROSPECTS

Muscovite books of good quality have been plowed up at two places on the Sugar Hill farm of the E. W. Swift Estate. Some of the books are said to have been as much as 8 in. in diameter. One locality (locality 65, pl. 27) is in the center of a field about three-quarters of a mile northeast of the farm office and 7.1 miles S. 23° E. of the Barnesville town square. The pegmatite is reported to contain a quartz core and a surrounding feldspathic zone with biotite and cinnamon-brown muscovite that locally is marked by "A" structure. The other prospect (location 66, pl. 27), in a cornfield about three-quarters of a mile southeast of the farm office, was opened in 1918 by a Mr. McDonald. The mica is cinnamon brown, hard, and flat. Some of the books contain "A" structure.

CLAY CHEEK (HARRISON W. HARP) MINE

The Clay Cheek mine (location 63, pl. 27) is on the C. B. Harrell farm near the southern boundary of Lamar County. It is 4.5 airline miles S. 9° E. of Barnesville. The mine workings are in a cornfield a few hundred feet east of the Harrell house. The deposit was worked under lease by Harrison W. Harp, of Thomaston, from November 1943 to July 1944. During November 1943 Harp dug a pit in a field where mica books had been turned up by plowing, and he later expanded this opening into a nearly vertical slotlike cut 25 ft long and 6 ft wide. Water was encountered at a depth of 22 ft, and work was suspended. Clay A. Cheek, who then took over operations, excavated an open-cut 85 ft by 25 ft in plan and 20 ft deep by means of a dragline and power shovel. The older workings were obliterated in the process. A 40-ft shaft was later sunk at the northeast end of the cut, and a 9-ft pit was dug at a point 50 ft northeast of the shaft. The mine was abandoned in January 1945.

A vertical pegmatite body 5½ to 6½ ft thick strikes N. 38° E. in partly granitized biotite gneiss whose layering trends N. 20° E. and dips moderately east. Both pegmatite and gneiss are thoroughly weathered except where exposed in the 40-ft shaft. The pegmatite body is symmetrically zoned, with a 1- to 2-ft central quartz

rib, a weathered perthite intermediate zone about 2 ft in average thickness, and a 6- to 12-in. wall zone of medium-grained quartz-feldspar pegmatite. Pockety concentrations of mica and white plagioclase occur in the coarsely crystalline perthite and between the perthite and massive quartz. Biotite is abundant in the wall zone, and pyrite in the gneiss near the pegmatite contacts.

Most of the mica is cinnamon-brown "A" material. Books as much as 15 in. in diameter were mined, and from the flat material between the "A" Reeves 3-by-5-in. and 4-by-6-in. sheets were trimmed. The mica, which is clear and free from clay stain, is of very good quality. The deposit does not appear to be exhausted, and possibilities for future mining seem good. It might best be developed by drifting from the 40-ft shaft.

OTHER MINES AND PROSPECTS

The information in the following descriptions was obtained chiefly from the report of Furcron and Teague:

Doc Irwin prospect.—A prospect 3½ miles northwest of Milner (location 56, pl. 27) consists of two pits that were sunk in 1942 along the northwest side of a quartz mass that may be as much as 500 ft long and 75 to 100 ft wide. One pit is 15 ft deep, and from its bottom drifts extend N. 40° E. and S. 40° W. The mica in the dump is clear and flat but cracked. In a 9-ft pit 80 ft to the northeast a 2-ft pegmatite body strikes N. 60° E. and dips 75° SSE. Mica is abundant, but the books are cracked, ruled, and stained.

J. W. Brown deposit.—Books of spotted mica as much as 4 in. in diameter have been plowed up in a field on the J. W. Brown property 3½ miles northwest of Milner (location 72, pl. 27). Most of the mica is flat and free splitting, but some contains "A" structure.

J. I. Taylor prospects.—A prospect pit that was dug about 1942 by J. I. Taylor, Jr., is 5.9 airline miles N. 20° E. of Barnesville (location 57, pl. 27). The pegmatite dike, which is enclosed in granitized mica schist whose nearly vertical foliation strikes east, trends N. 10° W. Mica occurs as clear "A" books of moderate size. A 15-ft trench that was dug by Taylor a quarter of a mile to the north-northeast exposes a 4-ft pegmatite body with a 1½-ft quartz core. The body strikes N. 30° W. and dips 45° WSW. Books of "A" mica as large as 6 by 8 in. have been obtained. They are badly ruled and cracked, and some contain inclusions of garnet. A little biotite is present also.

H. S. Worsham prospect.—A small pit on the H. S. Worsham property, 1½ miles northeast of Barnesville and half a mile east of the Barnesville reservoir, exposes a body of fine-grained pegmatite that strikes east and

dips 45° N. in coarse mica schist (location 59, pl. 27). It contains small, brownish books of mica that are free splitting and flat but lightly specked.

H. B. Manrey prospect.—A pegmatite deposit that contains kaolinized feldspar, quartz, and mica was prospected at a point 6 miles east of Barnesville (location 60, pl. 27). A 20-ft shaft was sunk in 1917 or 1918, and a small trench and a 10-ft pit were dug in 1942. The country rock is biotite gneiss whose nearly vertical foliation strikes N. 26° E. The mica, which is flat and brown, occurs as books 2 in. or less in diameter. Some are specked with tiny biotite crystals.

Ingraham prospects.—A deposit on the old Potts estate, at the Lamar County-Monroe County line 6.7 miles S. 80° E. of Barnesville (location 67, pl. 27), was worked in 1917 and 1918 by a Mr. Lambert, who excavated several pits 30 to 40 ft deep and connected them by means of tunnels. The present owners are O. W. Ingraham and O. B. Ingraham. The pegmatite, which strikes N. 25° E., is 4½ ft thick and contains a quartz core that is fringed by book mica. The books are light brown, clear, flat, and of good quality.

About an eighth of a mile to the north a pit was sunk about 20 ft in a vertical pegmatite body that strikes N. 55° E. and is about 5 ft thick. It contains small inclusions of schist, and some burr rock occurs near the northwest contact. The mica is brownish. Some of it is marked by "A" structure, and most is badly cracked.

Thomas mine.—About 1,400 lb of merchantable mica is said to have been removed from several small pits and a 20-ft shaft on the property of Col. A. J. Thomas, which is 8½ airline miles S. 25° E. of Barnesville on the west side of the Barnesville-Culloden highway (location 70, pl. 27). The mining was done in 1921 by a Mr. McDonald, of Yatesville. The pegmatite body is reported to have been about 2 ft thick and to have dipped moderately southwest at the point where it was first exposed. It is said to have flattened down dip, however, and to have been followed back to the surface about 40 ft away. Thus it may be a trough-shaped body. The mica, much of which was badly stained, was scattered throughout the pegmatite. Some large books were obtained.

A small pit was dug in a 2-ft pegmatite body half a mile east-northeast of the tenant house. It strikes N. 20° E. in granitized biotite gneiss and consists chiefly of burr rock.

Perdue prospect.—A prospect 4.7 airline miles S. 20° E. of Barnesville and 75 ft north of the dirt road along the Lamar County-Upson County line (location 69, pl. 27) is owned by B. F. Perdue. It was opened by R. V. Millner and was worked under lease by L. M. Johnson in 1942. The main opening, which comprised

a pit 25 ft deep and a short incline that sloped northeast from the pit floor, collapsed in December 1942. The pegmatite body appears to strike N. 45° E. and to dip southeast. It contains a 2- to 3-ft quartz core, and in the dumps are fragments of coarse perthite, kaolinized plagioclase, some biotite, and scattered light to dark brownish books of muscovite. These are flat, clear, and free splitting. Some contain "A" structure and small quartz inclusions, and others are ruled. Six-inch sheets could be trimmed from the largest books.

Williams and Holmes prospects.—An elongate group of small pits trends west-northwest for about 300 ft on the Williams and Holmes properties 4 miles south of Barnesville (location 68, pl. 27). The country rock is granitized biotite-garnet gneiss whose foliation strikes N. 30° E. and dips 70° ESE. Several outcrops of massive white quartz and float books of mica as much as 5 in. in diameter occur about 100 yd to the east-southeast. The mica is brown, hard, and flat, but the books are very small.

Old Childs prospect.—Some sheet mica was obtained by Roy Tangle in 1917 and 1918 from the property of Col. H. B. Manrey, 6.6 airline miles S. 73° E. of Barnesville (location 71, pl. 27). A drift extends N. 75° E. from the bottom of a 25-ft shaft that was sunk in an open field. The dump contains milky quartz, kaolinized feldspar, and small books of brownish muscovite. Much of the material is curved and marked by "A" structure.

MONROE COUNTY

BATTLES AND CHATFIELD MINES

The Battles mine (location 74, pl. 27), which is 2¾ miles N. 50° W. of Culloden, is near the summit of a low hill at an altitude of approximately 600 ft. It is owned by F. H. Chatfield and W. A. Chatfield, of Monroe County. The first prospecting was done about 1918 by Harvey Lyle and Calvin Battle, who sank a shaft (now filled) to a depth of 25 ft. J. E. Burleson leased the deposit in 1920, and at his direction Oliver Howell sank shaft A to a depth of 70 ft (pl. 37). Shaft B was sunk soon thereafter, and from it a 65-ft drift was driven southeast along the northeast wall of the pegmatite dike. Overhand stoping was carried to heights of 20 to 30 ft, and a connection was made with an irregular stope from the bottom of shaft A.

The mine was idle from 1921 until 1942, when the Georgia Mica Co. (J. J. Egan, president) began operations and continued until late in 1944. Herman Maxwell worked the deposit for a short time late in 1944. During the last two periods of operation the irregular stope between the two shafts was extended laterally and downward. Later stoping was done at higher levels, and waste was allowed to accumulate on the floor to

a depth of 10 to 20 ft. In December 1944 Howell began mining a pillar near the bottom of the stope and 10 to 15 ft north of shaft A. Work was continued intermittently for several months. In June 1945 the U. S. Bureau of Mines explored the deposit by means of two diamond-drill holes.

The pegmatite, a thick, irregular, steeply dipping, discordant body, is enclosed by biotite gneiss whose foliation varies in attitude but generally dips southeast at low angles. This gneiss has been thoroughly impregnated with granitic and pegmatitic material. The pegmatite dike, which locally is more than 40 ft thick, is Y-shaped in plan. In the north end of the stope it is thick, tabular, and relatively regular. The hanging-wall contact, which is exposed in shaft B, dips very steeply southwest. At the south end of the stope the pegmatite splits into two branches, with a thick intervening septum of gneiss. The keel of this septum appears to plunge steeply south. The diamond drilling has demonstrated that both branches of the body pinch out downward. The southwest branch probably was completely worked out in the vicinity of section *E-E'* (pl. 37).

The pegmatite is coarse-grained and crudely zoned. The core consists of massive quartz and blocky perthite. In the southwest part of the main stope the perthite occurs along the southwest margin of the core in blocks as much as 8 ft across. Some of the smaller blocks have well-developed crystal faces. The wall zone, in which lithologic variations are common, consists of graphic granite, blocky plagioclase, plagioclase-quartz-muscovite pegmatite, burr rock, and plagioclase-quartz-perthite pegmatite. The border zone is a thin plagioclase-quartz selvage. Accessory gray-green apatite occurs in crystals as much as 1 in. in diameter and 3 in. long. Fine-grained garnet occurs along the cleavage planes of perthite fragments and in the apatite. Small vugs are lined with crystals of microcline and mica books that contain tourmaline inclusions. A few fragments of pale greenish-blue beryl, some as much as 2 in. in diameter, are on the dump.

Book mica is moderately abundant near contacts with the country rock and along the margins of the core. Owing to the irregularity of the pegmatite and the erratic distribution of the quartz masses, mica has been mined over a considerable thickness of the body. Six-inch books are common, and some as much as 10 in. in diameter have been obtained. The mineral is medium to dark cinnamon brown, flat, hard, free splitting, and of moderately good quality. Cracks probably are the chief defect. Some books contain "A" structure and others are lightly specked, tangled, and marred by a green mottling.

Although past production of sheet mica from the deposit has been moderately large, the outlook for future operations is not particularly encouraging. Some mica-bearing pegmatite may occur beneath the present workings at the north end of the stope. At the bottom of the stope the richest mica concentrations lie near the hanging wall of the dike and along the west margin of the gneiss septum. The southern part of the deposit, especially the west limb, probably has been largely worked out, with only scattered pillars that can be robbed.

The Chatfield mine, which is about 200 ft northwest of the Battles (location 74, pl. 27), is in the northward continuation of the Battles dike. It was worked in December 1943 by the Georgia Mica Co. Drifts were driven north and south for short distances from the bottom of a 45-ft shaft. This opening collapsed in April 1944. Oliver Howell began to sink a new shaft that was aimed at the pegmatite near the heading of the drift, but work was suspended at a depth of 30 ft.

The pegmatite dike, which is about 20 ft thick, is unlike that mined in the Battles stope. Most of it is a medium-grained intergrowth of perthite, quartz, a little muscovite, and biotite. Plagioclase occurs sparingly. Howell states that a promising mica shoot was being mined in the south drift when the workings collapsed. The mica is similar to that in the Battles pegmatite, but the books probably are somewhat smaller and the material in them of noticeably poorer quality. Reopening of the mine might be a risky economic venture.

HOLMES MINE

The Holmes mine (location 75, pl. 27) is 1.6 miles N. 1° W. of Culloden. It was opened in 1918 and worked through three shafts to a depth of about 30 ft by Harvey Lyle and Calvin Battle. The value of the recovered mica is said to have been about \$5,000. The mine was idle until 1942, when the Georgia Mica Co. obtained a lease from C. H. Holmes, the owner, and operated for a few months during the fall of that year and from May to October 1943. The shallow old workings are caved and inaccessible. The more recent workings include two shafts that are connected by an irregular inclined stope, as well as a 29-ft shaft with several appended small workings near its bottom (fig. 135). A 16-ft shaft, now inaccessible, is probably in wall rock.

The pegmatite body, which is unusually irregular, trends N. 60° W. and generally dips south-southwest. In the shaft and drifts in the western part of the deposit, however, it is tabular, has a thickness of 10 ft, and dips steeply south. It is a medium- to coarse-grained aggregate of thoroughly weathered white feld-

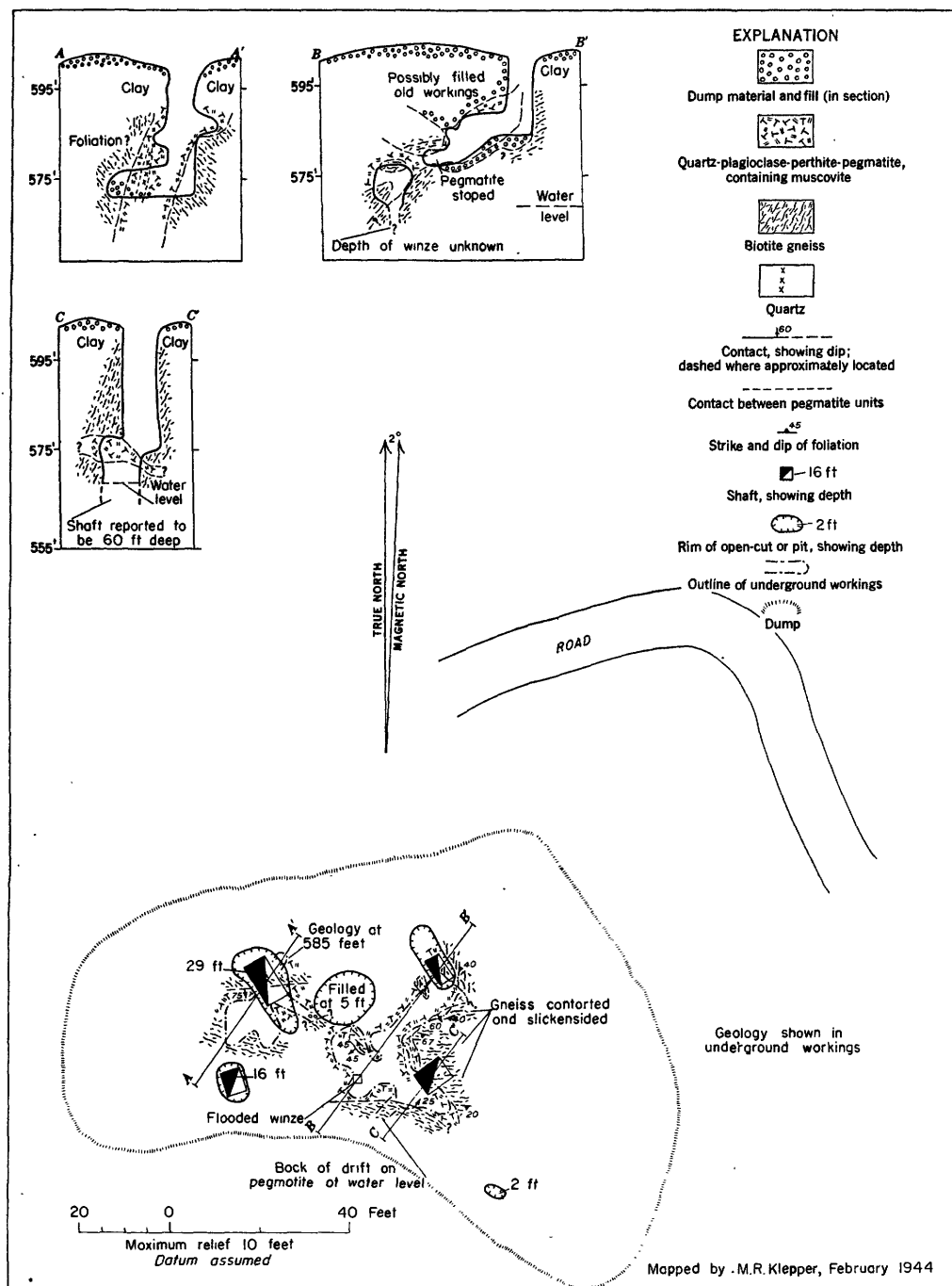


FIGURE 135.—Geologic map and sections of the Holmes mine, Monroe County, Ga.

spar (plagioclase?), partly kaolinized cream-colored perthite, quartz, and muscovite. A little quartz-muscovite pegmatite (burr rock) is present locally near wall-rock contacts. Small lenses of quartz and blocks of perthite form a discontinuous core. A few concentrations of coarsely crystalline muscovite, which are associated with quartz, are scattered throughout the wall-zone pegmatite.

In the eastern workings the pegmatite mass is roughly T-shaped in plan. It varies considerably in thickness, with an average of 5 ft, and its segments generally dip south or west at moderate angles. Many small inclusions of gneiss are present, and irregular tongues of pegmatite extend from the main mass into the wall rock, a severely contorted and slickensided granitic gneiss. The stem of the "T" dips northwest and has

been followed downward (beneath old workings) from the 18-ft shaft. At the south end of the eastern workings both arms of the "T" have been explored. In general the west arm dips southwest, but it may steepen westward to join the pegmatite mined from the west shaft. This arm also forks around a septum of wall rock at the collar of a winze (section *B-B'*, fig. 135) that explores the lower fork. The east arm of the pegmatite body is 1 to 4 ft thick and generally dips south at moderate angles. Locally, however, it rolls and dips gently north. It may pinch out a short distance beyond the north heading.

The pegmatite is a rather homogeneous aggregate of thoroughly altered feldspar (probably both plagioclase and perthite), quartz, and a little muscovite. Black tourmaline occurs locally. All the book mica is intergrown with quartz in small pods that are irregularly distributed through the pegmatite. Much of the mica exposed in the workings and in the dumps is cinnamon-brown "A" mica that is in tangled, curved, and cracked books. The remainder, though flat, is badly ruled and cracked. Near the surface the books are heavily clay-stained. Punch and small-sheets can be trimmed from the larger "A" books and from the flat or slightly warped books. Eighty-five percent of the trimmed sheets produced during 1943 were of punch size, and only about 2.5 percent were 3 by 3 in. or larger. The pegmatite in the east workings probably contains 1 to 1.5 percent of recoverable mine-run mica, which probably would yield not more than 4 percent trimmed sheet material, or about 1 lb of sheet per ton of pegmatite mined.

REV. THADDEUS PERSONS MINE

The Rev. Thaddeus Persons mine (location 76, pl. 27) is in the southwest corner of Monroe County 3.65 miles N. 1° W. of Culloden. The deposit was first worked in 1914 and 1915 by Harry Lyle and Calvin Battle, who dug an open-cut. J. E. Burleson carried on operations for about a year during World War I. He sank two shafts, the deeper of which was about 35 ft, and shipped 4 carloads of mine-run mica.

In 1942 the mine was leased to H. R. Grindstaff and S. W. Blalock, who sank two shafts at the east end of the open-cut to depths of 35 and 38 ft. In the summer of 1943 Luther Johnson, of Barnesville, leased the deposit from the Colonial Mica Corporation, which at that time owned it. During the following few months he sank a 42-ft shaft near the east wall of the old open pit, drifted 11 ft northeast at a depth of 20 ft, and drifted southeast for 20 ft at the 37-ft level (pl. 38). He also sank a 9-ft shaft in pegmatite in the floor of the old pit about 50 ft northwest of the 42-ft shaft.

The country rock is a biotite gneiss with lit-par-lit stringers of granitic and pegmatitic material. In the long crosscut driven beneath the open pit the gneissic structure strikes uniformly N. 70° E. and dips 25° to 30° SSE. In the shafts northeast of the crosscut heading the foliation is less regular. A gently arched structure is exposed in the 26-ft shaft, and in the 42-ft shaft the foliation dips steeply south. Most of the pegmatite occurs as crosscutting lenses and lit-par-lit sills that are a foot or less thick. One of these is in the southern 26-ft shaft, near the crest of the arch, in the country rock. Other thin, concordant lenses are exposed in the drift from the bottom of the 22-ft shaft. No pegmatite can be seen in the timbered 42-ft shaft, but Johnson states that the lens was discordant. The drift is reported to have been driven along a 4- to 18-in. pegmatite body, and another thin, mica-bearing pegmatite was followed northeast from the shaft at a depth of 20 ft.

The 9-ft shaft was sunk in a 1-ft zone of coarse book mica along the vertical northeast contact of a pegmatite body that is at least 5½ ft thick. The remainder of the pegmatite is an aggregate of thoroughly kaolinized feldspar, quartz, and a little muscovite in small books. A short drift that was driven into the west wall of the open-cut 9 ft beneath the rim follows the northeastward-dipping contact of a pegmatite mass at least 15 ft thick. It contains a 1-ft wall zone that is rich in clay-stained mica. A 6-ft intermediate zone of kaolinized feldspar flanks a 9-ft core of massive quartz. A wide area northwest of the cut is covered with float blocks of massive quartz and quartz-muscovite pegmatite (burr rock). The 12-ft shaft and drift in this area expose the northeast contact and a 10-ft thickness of a pegmatite body that is rich in small mica flakes.

The scattered exposures suggest that the main pegmatite body, which trends N. 60° W., contains a large globular quartz core flanked by quartz-muscovite pegmatite and feldspar-quartz pegmatite. It tapers to the east-southeast and branches into thin fingers, some of them concordant and others discordant. These fingers appear to have yielded most of the mica taken from the deposit. The mica is reported to be of good quality. The small books in the old dumps are clear, flat, hard, and cinnamon brown. Some "A" books were mined in the 9-ft shaft, but punch and small-sheets could be trimmed from them. Many books are ruled. The most favorable area for small-scale prospecting is between the 9-ft shaft and the short drift in the west wall of the open-cut. This appears to be where the pegmatite body begins to fork, and, according to local reports, the deposit has not been mined beneath the floor of the cut at this point.

PERSONS NORTHEAST PROSPECT

Pegmatite is exposed in two pits (location 77, pl. 27) on the north side of the access road about 900 ft N. 60° E. of the Rev. Thaddeus Persons mine. It is a dike that strikes N. 60° E. and dips steeply in nearly horizontally foliated gneiss. In the deeper pit it is at least 6 ft thick. A lens of quartz is surrounded by graphic granite, kaolinized feldspar-quartz pegmatite, and quartz-mica pegmatite. Both greenish "A" mica and small books of flat, cinnamon-brown mica have been mined. Cracks and ruling are the chief defects. Quartz-mica pegmatite and quartz-kaolinized feldspar pegmatite are exposed in the shallower pit.

PERSONS WEST PROSPECT

The Persons West prospect (location 78, pl. 27) lies about 1,000 ft N. 44° W. of the Rev. Thaddeus Persons mine. A thin pegmatite body has been worked by means of a 10-ft vertical shaft, a 10-ft drift from its bottom, a 30° incline 34 ft long, and several shallow surface cuts (fig. 136). Mining was carried on by L. M. Johnson during the period 1918-22 and again in 1943. About 4 sacks of mine-run mica were taken from the incline during the last operation.

The pegmatite body is 12 to 18 in. in thickness. It consists of kaolinized feldspar (both cream-colored perthite and white plagioclase), quartz, muscovite, and biotite. One 4-by-6-in. muscovite book was found on the dump from the 10-ft shaft. Concentrations of mica probably are widely scattered, and very few books are exposed. They are light cinnamon brown. The thin, mica-poor deposit offers little promise for future operations.

PETERS MINE

The Peters mine (location 84, pl. 27), which is 7¼ miles southwest of Forsyth, is owned by L. E. Peters, of that town, and was opened in 1919 by William Miller. The main shaft, which is said to be 37 ft deep, was sunk along the nearly vertical east margin of a pegmatite sill that strikes N. 20° W. in biotite gneiss. The west contact is exposed in a small stope 15 ft below the surface. The pegmatite is 15 to 18 ft thick, and its eastern part consists chiefly of coarse-grained perthite. The remainder is a weathered medium-grained aggregate of plagioclase and quartz. Large books of clear, light cinnamon-brown flat-A mica occur in the medium-grained rock. Biotite also is present.

An inaccessible 30-ft shaft is reported to be connected with the main shaft by a 57-ft drift that trends S. 20° E. A shallow pit, possibly the surface expression of a caved shaft, lies between the two shafts. The original mining operation lasted about a year, and it is reported that crystals of "A" mica as much as 16 in.

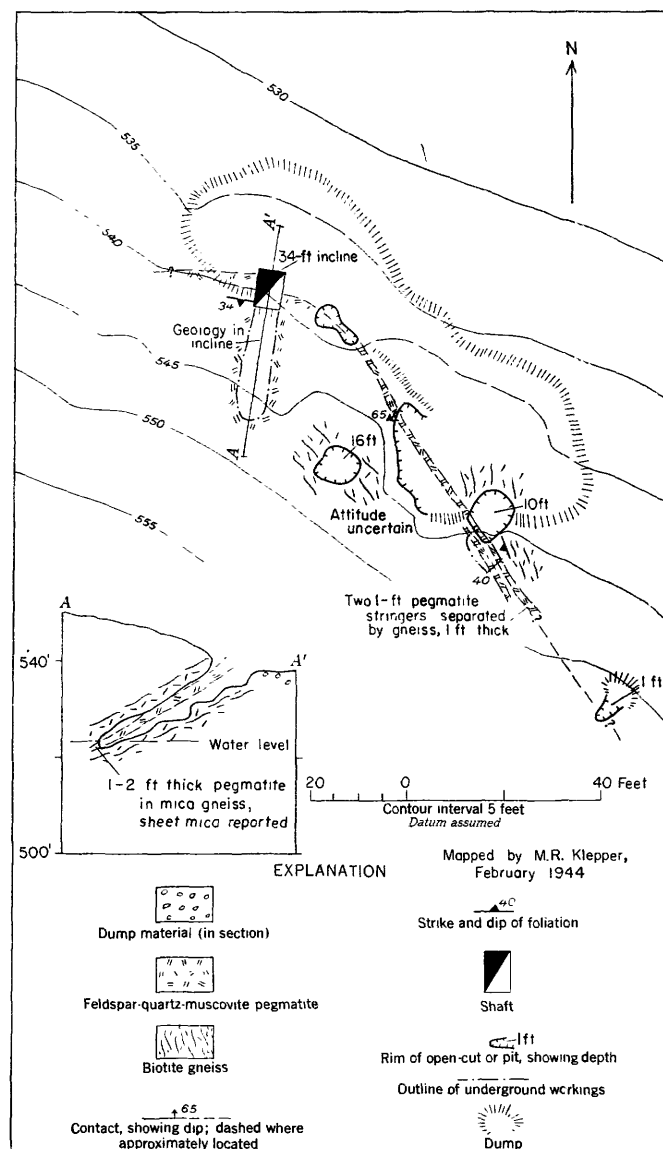


FIGURE 136.—Geologic map and section of the Persons West prospect, Monroe County, Ga.

in diameter were obtained. In 1942 the property was leased to M. S. Black, who unwatered the main shaft and drove 5 ft westward from the bottom, where he encountered a massive quartz core fringed with scattered books of "A" mica. Little sheet mica was recovered from the mined books.

FLETCHER MINE

The Fletcher mine (location 86, pl. 27), which is 5.6 miles southwest of Forsyth and an eighth of a mile southwest of Hopewell Church, was first worked from 1918 to 1920 by Lambert and Phinazee. The main shaft, which was sunk to a depth of about 50 ft, was reopened about 1927 by Owens and McKinney, who deepened it to 60 or 75 ft. The two shafts 110 ft and 275 ft north

of the main opening were sunk during this second period of operation. The present owner is L. W. Cobb, of Atlanta.

Neither the pegmatite body, which strikes due north and dips 45° W., nor the mica gneiss country rock is exposed at the surface. Partly decomposed pegmatite in the north shaft, which is 25 ft deep, and in the dump from the main shaft is chiefly a medium-grained aggregate of plagioclase and quartz. Biotite is abundant on the main dump. What little muscovite remains near the workings is clear, light cinnamon brown, and flat. It is most abundant in the dumps from the south workings.

An old 35-ft shaft lies 200 ft S. 20° E. of the main workings, and two shallow pits are 100 ft south of this shaft. The mica in the dumps is brown, flat, hard, and free splitting. Biotite sheets as much as 3 in. in diameter also are present.

THURMAN MINE

Two groups of workings that apparently were sunk on at least three pegmatite bodies constitute the Thurman mine (location 89, pl. 27), which is 3½ miles southwest of Forsyth. It is owned by H. S. Worsham, of Forsyth, and was leased in 1942 to the Meyer and Brown Corp., of New York City. The mine was first operated by Lambert and Way during the period 1918–20, and it was worked by Owens and McKinney about 1927. According to Luther Phinazee, the principal shafts are 40 and 50 ft deep (fig. 137), and the total production from

the deposit has amounted to about 30 tons of mine-run mica.

The eastern pegmatite body strikes northwest and is 3 ft thick. The western body is at least 15 ft thick. The mica in the dumps is clear, light cinnamon brown, and wavy and occurs in books 3 by 5 in. or smaller. All the mining probably has been done in decomposed pegmatite above the level of ground water.

PHINAZEE MINES

The two Phinazee mines are 3¼ miles S. 80° W. of Forsyth on land owned by H. H. Hardin, of that town (location 90, pl. 27). They are about a quarter of a mile apart and are known as the southeast and northwest mines. Most of the mining was done from 1918 to 1920 by Lambert and Dale, and, after the deposit had lain idle for several years, operations were resumed by Owens and McKinney. Luther Phinazee, the former owner, estimates that 40 tons of mine-run mica has been produced from the two mines.

Pegmatite is exposed only at the southeast mine, where it appears in a 20-ft prospect shaft that was sunk in 1941 by the Meyer and Brown Corp., of New York City. The nearby workings consist of four shafts, one of which was 50 ft deep. One has caved to form a pit, and the others have been filled. The pegmatite in the recent prospect shaft is medium-grained and thoroughly decomposed. The body is at least 8 ft thick, and neither

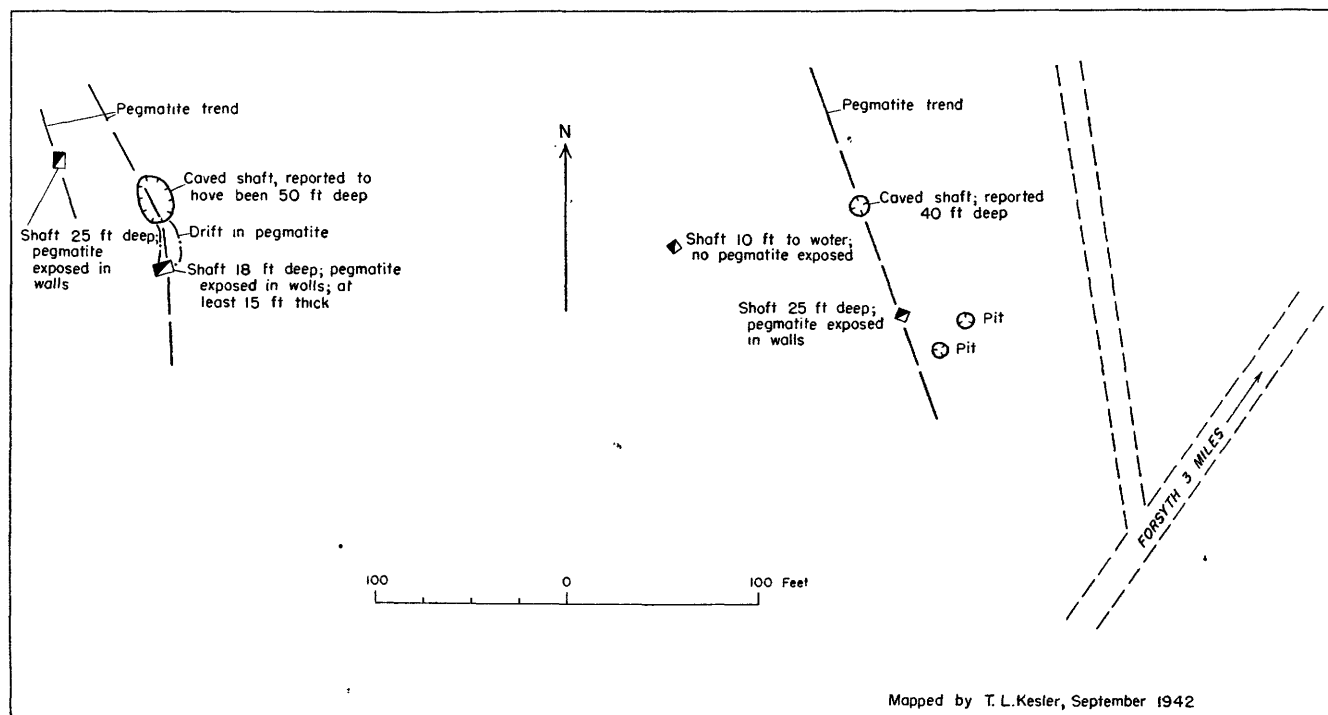


FIGURE 137.—Map of the Thurman mine. Monroe County, Ga.

wall is exposed. It contains mica that is clear, flat, and light cinnamon brown. The books on the dump are very small.

The main opening at the northwest mine is a cut 75 ft long and 35 ft in maximum width. Its long axis trends N. 12° W., and at its southern end is a shallow, water-filled shaft. Its floor and walls are now covered by backfill, but Phinazee states that a pegmatite body nearly as wide as the cut was mined. The maximum depth of the opening is said to have been 35 ft at its southeast end. A short drift was driven along a part of the pegmatite body that swings to the southwest. The mine is in rather marshy ground, and ground water seriously interfered with operations. Rock decomposition extends to relatively shallow depths, and material from the deepest part of the opening is only partly weathered. The pegmatite consists chiefly of medium-grained plagioclase and quartz. The mica is clear and light cinnamon brown. Some is flat, and some is flat-A material.

BROOKS MINE

The earliest known work at the Brooks mine (location 95, pl. 27), which is 2.6 miles south of Forsyth, was done during or shortly after World War I by a Mr. Kinsley. Operations were carried to a depth of at least 50 ft, and considerable work was done at shallower levels. The mine was abandoned until late in 1928, when L. M. Johnson sank 35-ft and 15-ft shafts (fig. 138). In 1941 he

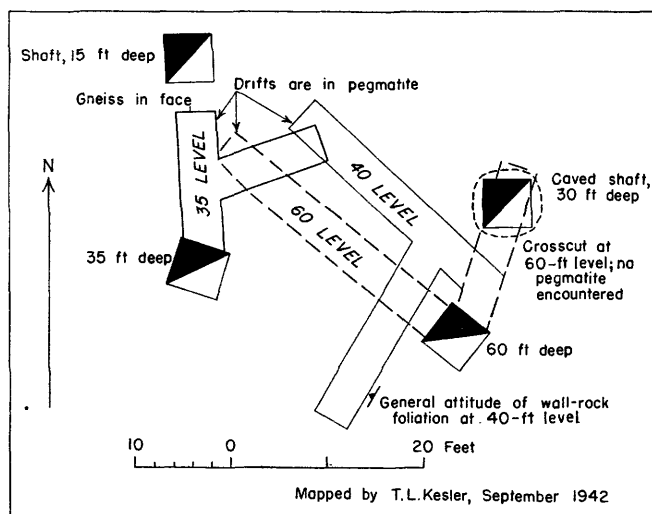


FIGURE 138.—Map of the Brooks mine, Monroe County, Ga.

sank a 30-ft shaft, and in May 1942 a 60-ft shaft was sunk by the Asheville Mica Co., of Biltmore, N. C. Although none of these workings is accessible, it seems likely that two or more very irregular pegmatite bodies have been mined.

Most of the older workings intersected by the new shafts were filled with waste. The deepest was at the 50-ft level. Johnson states that he recovered small quantities of mica from pegmatite adjacent to older workings. All the material on the dumps is thoroughly weathered. The mica occurs as clear, light cinnamon-brown flat-A books. The largest trimmed sheets were 4 by 6 in., but it is reported that skimmings as large as 10 by 12 in. were found in the older workings. Additional production from the deposit probably must come from levels beneath the deepest old workings.

CALLOWAY MINE

The Calloway mine (location 96, pl. 27) was opened shortly after World War I by Lambert and Way. It is 2.5 miles north-northwest of Forsyth and is owned by W. I. Calloway, of Atlanta. The principal opening is an east-west cut 63 ft long and as much as 25 ft wide. It has caved and is now only 8 ft deep, but its maximum depth may well have been as much as 25 ft. A smaller open-cut, also caved, lies 28 ft to the southeast, and a 10-ft shaft is 23 ft east of the main cut.

Thoroughly weathered mica gneiss whose foliation strikes N. 30° to 45° NW. and dips 35° to 50° NE. is exposed in the shaft and at the end of the main cut. Pegmatite, however, is not exposed. The deposit in the main cut probably was mined out. The shaft, which was sunk for exploratory purposes, is in country rock. Decomposed pegmatite occurs in the dumps from the cuts, which also contain small books of clear, light cinnamon-brown, unusually flat mica. Some are marred by inclusions of quartz and biotite.

SMITH MINE

The Smith mine, which is owned by Mrs. Mary Martin, is 9 miles north of Forsyth (location 107, pl. 27). The deposit is said to have been opened in 1917, and in 1918 Gus Weldon sank a 31-ft inclined shaft at its north end. He also dug a shallow cut 55 ft long and drove a drift 23 ft from its south end (fig. 139). Later a 24-ft inclined shaft was sunk, and in 1942 Clay A. Cheek, L. A. Rogers, and J. K. d'Antignac sank a 34-ft shaft. A drift connects this new opening with the 24-ft shaft and intersects the Weldon shaft to the north at a point 10 ft above its bottom.

The pegmatite dike, which is 3 to 8 ft thick, strikes north and dips 70° E. In the northern and southern parts of the mine it is approximately conformable with the foliation of the enclosing biotite gneiss. The east contact cuts across the country-rock structure, however, at the bottom of the new shaft. At this point the dike is 6 ft thick, but it is at least 8 ft thick at the bottom of the Weldon shaft, where only the footwall contact is

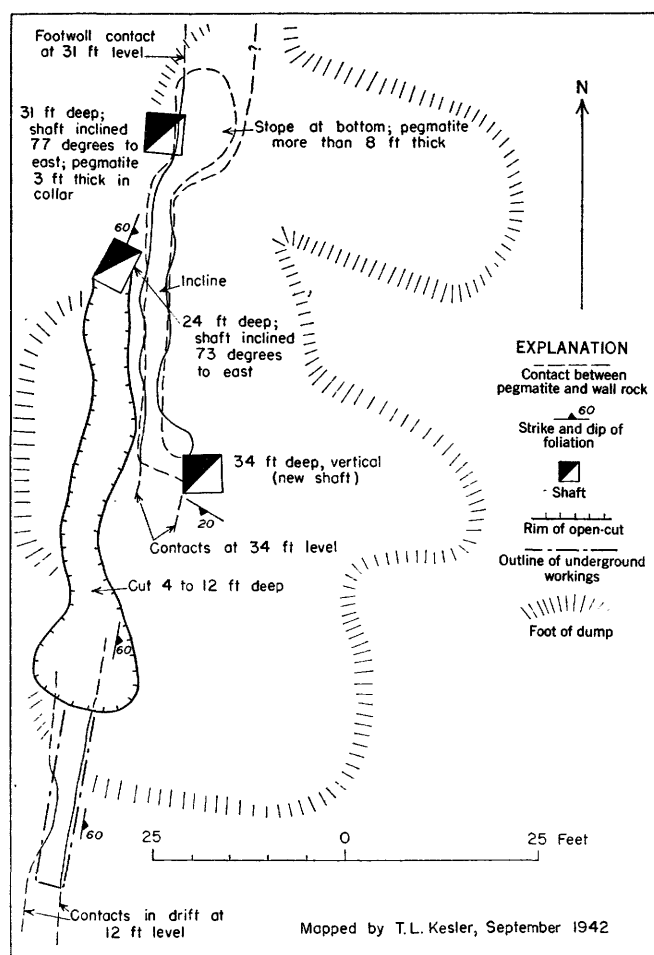


FIGURE 139.—Map of the Smith mine, Monroe County, Ga.

exposed. The pegmatite consists of plagioclase, perthite, quartz, and tourmaline and is relatively undecomposed. A piece of allanite was found on the dump. The mica is most abundant at the bottom of the Weldon shaft and in the drift between the 24-ft and 34-ft shafts, where it occurs along the footwall contact. It is clear and pale cinnamon brown. Much is bent and hair-cracked. The mine-run books contain a high proportion of scrap and punch material.

OTHER MINES AND PROSPECTS

The information in the following reports was obtained chiefly from the report by Furcron and Teague:

O. B. Clements prospect.—Pegmatite is exposed in a road cut and in several pits southeast of the road on the Clements property (location 80, pl. 27), which is $4\frac{1}{4}$ airline miles due north of Culloden and near the Monroe County-Lamar County line. The country rock is a granitized mica schist. The pegmatite body, which is 6 ft thick, contains pods of milky quartz and mica books as large as 3 by 4 in. Most of the mica is marked by

“A” structure and is ruled, cracked, warped, and tied.

Haygood prospect.—A little prospecting was done by C. M. Wacaster and a Mr. Boone on the Haygood farm (location 79, pl. 27), 3 miles N. 17° W. of Culloden. A trench 8 ft long was dug in January 1943. It trends N. 45° E. and probably is parallel to the strike of the pegmatite body. A thin quartz core is flanked by feldspathic pegmatite that contains brownish flat-A mica. Large, hard books from which 3-by-6-in. sheets could be trimmed are reported.

Holloway mine.—Mica of good quality was obtained from a deposit 6 airline miles N. 75° E. of Culloden. The mine (location 81, pl. 27), which is owned by a Mr. Abercrombie, of Dyas, was first worked by Gus Weldon. Four pits 20 to 50 ft apart and as much as 30 ft deep were dug along a curving line that strikes N. 70° E. near the road and N. 45° E. farther northeast. The two pits nearest the road were connected by a drift. The workings are now filled, but the dumps contain quartz, kaolinized feldspar, muscovite, biotite, and burr rock. The muscovite is flat, brown, and hard. Some occurs as unusually well formed crystals that contain minute muscovite inclusions and small intergrowths of quartz.

Homer Hardin mine.—A deposit (location 82, pl. 27) 5 airline miles N. 64° E. of Culloden was opened in 1917 by Calvin Battle and was later worked by Gus Weldon. The present owner is Homer Hardin. A 30-ft incline slopes northeast from a large open pit, and a crosscut extends northwest from a point near the portal of the incline to a shaft 20 ft away. A second shaft lies immediately to the southwest, and a third, shallow shaft, from which an incline has been driven northeast and a drift northwest, is 40 ft southeast of the open pit.

The pegmatite body appears to be an irregular sill that strikes N. 40° E., dips 64° SE., and is several feet thick. It is a medium- to coarse-grained aggregate of kaolinized feldspar, quartz, and muscovite. The mica, which is associated with small lenses of quartz, occurs in books as much as 3 in. in diameter. It is flat, brown, and free splitting, but badly cracked.

Ruffin prospects.—Several prospect openings have been dug by B. F. Ruffin on his farm (location 83, pl. 27), which is $7\frac{1}{4}$ airline miles S. 7° W. of Forsyth. A 39-ft pit exposes a nearly vertical pegmatite body that strikes N. 58° W. It is 3 ft thick at a depth of 10 ft but branches upward into two stringers. A lens of smoky quartz is surrounded by an aggregate of feldspar, quartz, and muscovite. The mica is brown, and the books generally are small, ruled, and cracked. Some of them are marked by “A” structure, and others contain quartz inclusions.

Several closely spaced shafts were dug to depths of 30 ft or less in an area southwest of the pit. The pegmatite is not exposed, but the foliation of the country-rock schist strikes north and dips 80° W. Biotite and clay-stained muscovite occur in the dumps. Five-inch muscovite books from which 2-by-3-in. sheets could be trimmed are reported. The largest and best mica books on the property are said to have been obtained from the shafts.

L. D. Owen prospect.—Two prospect pits 18 ft deep and 25 ft apart were dug in 1929 by C. B. Owen on the L. D. Owen property (location 85, pl. 27) 5½ miles southwest of Forsyth. The present owner is Ray McNealy. A 6-ft pegmatite that strikes N. 85° E. and dips 45° S. contains books of mica 3 in. or less in diameter. A 2½-ft pegmatite body was prospected at a point 200 yd southeast of the tenant house during World War II. It is a sill-like body that strikes N. 25° E., dips 45° ESE., and contains several stringers of schist. The mica is brown, warped, tied, and marred by quartz inclusions.

Cox prospect.—A prospect 4¾ airline miles south of Forsyth on the old Jerry Cox property (location 87, pl. 27) is owned by the Bramlette Hardware Co., of Forsyth. The mica occurrence was discovered about 1942 by B. F. Ruffin, and shortly thereafter a Mr. Childs, of Griffin, dug a 15-ft pit. The pegmatite body which is not exposed, is at least 7 ft thick and is enclosed by coarse biotite gneiss. The dumps contain unweathered perthite, quartz, muscovite, and books of biotite as large as 2 by 3 in. The muscovite is light brown. It is hard but badly curved, cracked, and ruled. Some books contain inclusions of biotite, quartz, green apatite, and smaller books of muscovite.

Rosa Fletcher prospect.—During the winter of 1942 B. F. Ruffin excavated a pit 10 ft long and 20 ft deep in a 3½-ft pegmatite on the Rosa Fletcher property (location 88, pl. 27), which is 3¼ airline miles south of Forsyth and 300 ft northeast of Tobesofkee Creek. A coarse-grained pegmatite body, which is nearly vertical and strikes N. 49° W., consists of graphic granite, blocky perthite, biotite, quartz, and muscovite. Biotite is abundant near the walls. The muscovite books are rather small, although some as much as 4 in. in diameter are present. Faint "A" structure, ruling, and biotite intergrowths are common. The color is brown.

L. P. Goodwin prospect.—A deposit on the L. P. Goodwin property, 2¼ airline miles west-southwest of Forsyth (location 92, pl. 27), was worked in 1918 by a Mr. Lambert, who sank a shallow shaft. This opening later was enlarged into a northwestward-trending cut 40 ft long and 9 ft wide. The pegmatite body, which probably strikes northwest and dips 75° to 80° NE.,

consists of plagioclase, perthite, quartz, muscovite, and apatite. An 18-in. mica zone is reported to overlie burr rock on the hanging-wall side and to lie beneath quartz on the footwall side of the deposit. Several tons of mica is said to have been obtained, and large books are reported. The mica is light brown and of good quality. It is flat, hard, and free splitting.

F. B. Willingham prospect.—A little mica was obtained from a prospect 100 ft north of the Forsyth-Barnesville highway 2¾ miles west-southwest of Forsyth (location 91, pl. 27). The deposit was opened in 1920 by W. W. Way, who sank a 12-ft shaft and drove a 15-ft drift to the southwest. The pegmatite is a coarse-grained aggregate of perthite, quartz, muscovite, and biotite. The dike is at least 8 ft thick. It strikes N. 30° E. and dips 50° to 70° ESE. It cuts across the country-rock foliation, which strikes N. 10° E. and dips 30° to 60° E., and contains some inclusions of schist. The mica books are brown, hard, and warped, and some contain "A" structure. A few small books were obtained from a 3-ft pit about a quarter of a mile N. 20° E. of the shaft.

C. A. Ensign mine.—A deposit on the C. A. Ensign property (location 93, pl. 27) 3 airline miles N. 63° W. of Forsyth was discovered and worked by Ed White. Later it was sold to Governor Eugene Talmadge, who filled the workings with dump material. The shaft, which was 18 to 25 ft deep, exposed a 6-ft pegmatite body that strikes N. 30° E. and dips 45° to 50° ESE. It contains a thick quartz core, some burr rock, quartz-feldspar intergrowths, and feldspar-rich pegmatite with 4-in. books of muscovite. Most of the mica is clear flat-A material. Granite and pegmatite crop out near the mine and are crossed by a diabase dike that strikes N. 30° E.

Worsham and Goodwin prospect.—A prospect owned by J. R. Goodwin and H. S. Worsham, of Forsyth, is on the north slope of a ridge 3 airline miles N. 55° W. of that town (location 94, pl. 27). The pegmatite body, which is exposed in a shallow trench 65 ft long, strikes N. 52° E. and dips 60° SE. in biotite gneiss whose foliation strikes N. 65° E. and dips 80° SSE. It is 4 to 6 ft thick and contains gneiss inclusions, some as much as 6 in. thick. It consists of perthite, quartz, biotite, and muscovite. Most of the muscovite books are small, badly cracked, ruled, and marred by quartz inclusions. The mica is brown and is hard, clear, flat, and free splitting.

Old Callaway prospect.—Lambert and Phinazee prospected a mica deposit (location 97, pl. 27) on the old Callaway property shortly after World War I. The workings include a shallow open-cut that is 40 ft long and elliptical in plan and two pits east and southeast

of the cut. They are $2\frac{1}{4}$ airline miles due north of Forsyth. The pegmatite sill probably strikes N. 55° W. and dips 70° NE. It may contain a massive quartz core. The mica in the dumps is small, brown, and somewhat warped and cracked.

Willie Bowdoin prospect.—Some prospecting was done about 1942 on the Willie Bowdoin farm (location 98, pl. 27), which is $4\frac{3}{4}$ airline miles N. 70° E. of Forsyth. Three shallow pits expose several pegmatite deposits, the largest of which is 3 ft thick. This body strikes N. 20° E., dips 30° E., and consists of smoky quartz, feldspar, and muscovite. The country rock is a granitized biotite gneiss. The mica books are generally small, although a few are as much as 5 in. in diameter. The mica is brown, hard, flat, and free splitting, but cracks and ruling are abundant.

New Ground mine.—A deposit (location 99, pl. 27) 2 miles southwest of Juliette was opened in 1915 by a Mr. Harris and worked in 1931 by H. L. Driskell, the present owner. A pit 65 ft long and 10 to 30 ft wide is the slumped remnant of a slotlike opening that was 26 ft deep. The pegmatite body, which is 3 ft thick, strikes N. 15° E. and dip 74° E. It consists of feldspar, quartz, mica, and garnet. The mica is light brown, hard, and clear. The most common imperfections are cracks, "A" structure, quartz inclusions, and lockiness.

About 100 ft to the southwest are several pits and a 60-ft trench that once was 26 ft deep. The pegmatite is cut by a diabase dike. It is reported to have yielded large books of "A" mica. Sheets 12 by 20 in. were obtained from the flat portions of the books. Some of the mica is clear, and some contains latticelike mineral stain. Ruling also is present. A short distance to the west a second trench was dug in an 8- to 10-ft pegmatite body that strikes north. It contains coarse gray to pink feldspar, garnet, and muscovite. The mica is brown and occurs as small, warped books.

Owl Hollow prospect.—In 1931 the Driskell brothers dug three small pits (location 100, pl. 27) in a deposit a quarter of a mile south of the New Ground mine and a quarter of a mile west of the Redding house. The pegmatite strikes N. 10° E. and dips 70° E. in granitized hornblende gneiss. It contains some garnet, but no mica of commercial value is present.

A. T. Redding prospects.—A little mica was obtained from prospect pits (location 101, pl. 27) on the A. T. Redding property $1\frac{1}{4}$ miles south of Juliette. The deposit was opened by a Mr. Harris in 1915 and worked by L. D. Gray in 1942. A pegmatite body that was exposed in a pit 12 ft long and 10 ft deep is reported to be 8 to 10 ft thick. Muscovite is concentrated along a quartz lens near the east contact. Biotite, in books as large as 3 by 4 in., also is present. The muscovite is

brown. Some is spotted, and most is tied. A small pit about half a mile N. 30° W. of the Redding house exposes quartz, feldspar, and books of greenish, spotted mica.

Walker Smith mine.—A substantial amount of mica is said to have been obtained from a deposit (location 102, pl. 27) 2 miles southwest of Juliette and three-quarters of a mile northwest of the Redding prospects. It was opened about 1904 by Dr. R. C. Goulsby, of Forsyth, the present owner, who mined to a depth of 16 ft or less. Some mica was obtained in 1919 by a Mr. Cleveland, and a little prospecting was done in 1942 by L. D. Gray. The workings consist of five pits in a line that trends N. 10° E. for about 75 ft. Their maximum depth is 22 ft. The pegmatite deposit, which is not exposed, probably strikes slightly east of north and dips 45° E. It is 3 ft thick. Most of the mica is reported to have been taken from the north end of the workings. A book 11 in. thick and 11 in. in diameter is recorded. Some of the material is marked by "A" structure, but most is flat, brown, hard, and free splitting. It is said to be associated with the quartz core.

E. J. Goggins prospect.—A 10-ft pit dug by E. J. Goggins about 1942 exposes an irregular 3-ft pegmatite sill that strikes N. 25° W. and dips 75° ENE. This prospect (location 103, pl. 27), which is owned by J. W. Johnson, of Cabaniss, is half a mile northeast of that town. A lens of milky quartz $1\frac{1}{2}$ ft thick occurs near the northeast contact of the sill. Little mica is exposed in the pegmatite, but the dump contains wavy and badly ruled books of clear, brown material. Sheets as large as 2 by 3 in. are reported.

Marie Vaughn deposit.—A thin burr-rock pegmatite mass (location 104, pl. 27) that strikes N. 10° W. is exposed behind a farmhouse on the High Falls road $8\frac{1}{2}$ miles north of Forsyth. The mica is hard, brown, small, and badly cracked and warped. Another pegmatite body, which strikes N. 26° W., occurs 0.6 mile S. 10° E. of the house. It contains mica that is clear, bent, cracked, and marked by "A" structure. About 0.4 mile west of the house is a body of pegmatite with a quartz core about 70 ft wide and 100 ft long. Feldspar, biotite, and muscovite also are present. The mica is clear and occurs in flat, ruled books $1\frac{1}{2}$ by 2 in. or smaller. Some of the sheets are curved and cracked.

Coleman prospect.—A little mica was obtained from a deposit (location 105, pl. 27) $8\frac{1}{2}$ miles N. 12° E. of Forsyth. It is owned by M. J. H. Stuart, of Forsyth. A pit was sunk to a reported depth of 50 ft, and drifts were run from its bottom. These workings are now filled. A 15-ft pit was dug by a Mr. English about 1942, and a 25-ft drift was run S. 17° W. from its bottom. The pegmatite sill strikes N. to N. 30° E. and dips about 30° E. to ESE. It is conformable with the

foliation of the enclosing biotite gneiss and contains numerous gneiss inclusions. Some quartz lenses also are present. Both greenish and brownish mica occurs. The books are bent, and some are marked by "A" structure.

E. B. Butler prospect.—A small pit (location 106, pl. 27) was sunk in 1917 on the E. B. Butler property, which adjoins the Coleman property on the north and is 9 miles north of Forsyth. The pegmatite sill strikes N. 30° E. and dips 65° ESE. in biotite gneiss. The dumps contain fragments of quartz and books of mica 1½ in. across.

C. M. Sutton prospects.—Cracked and warped books of mica as much as 3 in. in diameter have been obtained from a deposit (location 108, pl. 27) on the west side of the Jackson road 9 miles north of Forsyth. An 8-ft pit that was dug in a field shortly after World War I yielded some biotite and a few pieces of "A" mica. About a quarter of a mile west of this pit are two others that were dug by Tom Stokes. The vertical pegmatite dike, which ranges from 2 to 4 ft in thickness and contains inclusions of mica schist, strikes N. 21° W. and cuts across the country-rock foliation, which strikes N. 40° E. and dips 51° SE. The north pit is reported to have been 20 ft deep. In a 6-ft pit 100 ft to the southwest the pegmatite body is at least 5 ft thick and contains biotite.

Westbrooks prospect.—A prospect owned by Mrs. W. H. Westbrooks was worked first in 1917 and 1918 and again in 1923, when a 40-ft shaft was sunk. The deposit (location 109, pl. 27) is 10¼ miles north of Forsyth and 2 miles east of Blount. In 1942 Mrs. Westbrooks' son obtained about 7 tons of mine-run mica, and shortly thereafter C. M. Wacaster recovered some scrap mica from fill in the old shaft. The pegmatite body apparently strikes N. 40° to 60° W., dips southwest to south-southwest, and is 15 to 20 ft thick. It consists of coarse feldspar, smoky quartz, muscovite, and biotite. Pods of massive quartz and inclusions of mica schist also are present. The mica occurs in rich concentrations around the schist inclusions. It is deep brown and badly bent and twisted. Much scrap mica could be obtained from the deposit, with possible recovery of feldspar as a byproduct.

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PART 10. OUTLYING DEPOSITS IN GEORGIA

BY E. WM. HEINRICH AND RICHARD H. JAHNS

ABSTRACT

Pegmatites are scattered through much of the Georgia Piedmont outside the Thomaston-Barnesville and Hartwell districts. Several of these deposits were studied during World War II. Most pegmatite bodies in Cherokee and Pickens Counties trend northeast and dip southeast, parallel to the foliation of the enclosing rocks. Quartz cores fringed with "A" mica are common. Most of the mica is light brown and contains scattered black specks. The deposits in Oconee County are concentrated in a northwestward-trending belt along the southwestern county line. Few of them have been extensively mined. The Jasper County and Troup County pegmatites are enclosed by mica gneiss and hornblende gneiss. The mica in the pegmatites is green and heavily spotted.

INTRODUCTION: FIELD WORK AND ACKNOWLEDGMENTS

Mica-bearing pegmatite deposits are scattered over broad areas in the Georgia Piedmont, chiefly in Cherokee, Pickens, Forsyth, Hall, Franklin, Oconee, Greene, Morgan, Walton, Rockdale, De Kalb, Fulton, Cobb, Paulding, Carroll, Henry, Fayette, Spalding, Jasper, Heard, Troup, Meriwether, and Talbot Counties (pl. 39). Descriptions of most of these deposits have been published (Galpin, 1915, pp. 51-155; Sterrett, 1923, pp. 71, 76-77; Furcron and Teague, 1943, pp. 80-118, 172-191; Veatch, 1909; Watts, 1913).

Work by the Geological Survey comprises examinations made by Sterrett in 1908 and 1914 and mapping and detailed study during the period 1943-46 by E. Wm. Heinrich, R. H. Jahns, M. R. Klepper, R. W. Lemke, L. C. Pray, W. C. Stoll, and J. R. Wolfe, Jr. The descriptions of individual deposits, which are grouped by counties, include much information summarized from the published record and from reports of field engineers of the Colonial Mica Corporation. General information concerning deposits in Cherokee, Pickens, Oconee, Jasper, and Troup Counties is summarized in the following pages by counties.

The Amphlett and South Amphlett deposits in Cherokee County were diamond-drilled by the U. S. Bureau of Mines during the fall of 1944, and the friendly cooperation of W. A. Beck, engineer in charge of the exploration, is gratefully acknowledged.

CHEROKEE AND PICKENS COUNTIES

GENERAL FEATURES

Many pegmatite deposits occur in Cherokee and Pickens Counties, but recent detailed mapping by the Geological Survey has been confined to the Amphlett mine and South Amphlett prospect in Cherokee County. The deposits in Pickens County and the northern part of Cherokee County occur in two belts of biotite gneiss (Carolina gneiss) that are northwest and southeast of the narrow belt of Murphy marble and Valletown formation and Brasstown schist. In southern Cherokee County most of the pegmatites are in a northeastward-trending belt of the Carolina gneiss that is flanked on the northwest by Ashland mica schist and on the southeast by diorite gneiss (Stose, 1939).

In general the pegmatite bodies trend northeast and dip southeast. Most of the strikes range from N. 30° E. to N. 60° E., and the dips tend to be very steep. Near Marble Hill in Pickens County, however, the regional structure appears to be relatively complex, and northwestward-trending pegmatites are rather common. Most of the mica deposits are conformable with the foliation of the enclosing metamorphic rocks. They are thin as compared with those in other districts.

Cores of massive quartz and rich concentrations of core-margin mica are characteristic of the pegmatite bodies. Wall-zone mica appears to be much less common. Most of the mica is light cinnamon brown to brown, and a little is yellowish olive to green. Scattered light-brown spots are widespread, and the core-margin mica generally is marked by "A" structure. Beryl occurs in some deposits but is not common.

Systematic mica mining probably began in 1889 at the Dean mine in Cherokee County, although it is locally reported that the J. V. Ledford deposit was opened as early as 1860. In 1907 the Pittsburg Mica Co. operated the Cook mine. During World War I much mining was done by J. E. Burleson. Prospecting and small-scale mining were carried on intermittently during the early 1930's. World War II caused some revival of activities, but production of sheet and punch mica was

not large. Much of the recent work was done by Edwin M. Clapp, Frank D. English, and A. W. Amphlett.

DESCRIPTIONS OF DEPOSITS

AMPHLETT (FRANKLIN) MINE

The main workings of the Amphlett mine, which are on a northwest slope near the top of a low ridge, are in Cherokee County, 0.4 miles S. 30° E. of Conn Church and 4.3 miles S. 86° E. of Ball Ground. The deposit was prospected in 1938 by Sam H. Freeman and in 1942 by J. L. Cornalison, who dug a shallow trench 20 ft long. In April 1942 A. W. Amphlett, of Ball Ground, leased the mine from the trustees of the Standard Pyrite Co., of Atlanta, and operated it until March 1945. The workings are on lot 46 of the Conn Creek district of the Standard Pyrite Co.'s properties.

The openings in the northern part of the deposit comprise several prospect pits and a series of bulldozer trenches that were excavated by the U. S. Bureau of Mines in 1944. The main, or central, workings include three open-cuts and four prospect trenches (pl. 40). The north cut of the main workings is 110 ft long, 20 ft in maximum width, and 22 ft deep. Down-dip stopes were sunk from its south side. From the middle cut, which is 70 ft long, 20 ft in maximum width, and 20 ft deep, an inclined shaft was sunk 35 ft at an angle of about 40°. The south cut is 180 ft long, 10 ft wide, and 22 ft in maximum depth. Underhand stoping was done from its floor for a strike distance of 45 ft, so that the rim of the cut overhangs as much as 14 ft. The U. S. Bureau of Mines explored the deposit by means of diamond-drill holes during the fall of 1944.

The country rock, a biotite gneiss, contains many sill-like bodies of pegmatite that strike northeast. Both pegmatite and gneiss are cut by a diabase dike that strikes northwest and dips steeply to moderately southwest. The pegmatite masses are thin and persistent but pinch and swell along both the strike and dip. The pegmatite body mined in the main workings is at least 500 ft long and is one of eight bodies exposed in the mine area. Six of them are exposed in the north workings.

The country-rock gneiss is dark-colored and fine- to medium-grained. It contains biotite, quartz, garnet, and feldspar. The foliation, which trends northeast and dips moderately southeast, is most strongly developed near contacts with the main pegmatite body. The biotite is relatively coarse near the contacts.

The pegmatite body mined in the main workings ranges in thickness from a few inches to 6 ft, with an average of about 1½ ft. The three thick bulges, which were mined in the cuts, appear to plunge S. 75° E. at an angle of 35°, or approximately parallel to striations on

the hanging-wall contact. The rock is a medium-grained aggregate of quartz, feldspar, muscovite, and abundant black tourmaline. Its thinner parts are streaked, owing to subparallel tourmaline crystals and elongated pods of feldspar. A 2-in. selvage of fine-grained quartz and muscovite occurs along the hanging wall.

A few quartz pods that are 4 in. in maximum thickness occur about midway between the walls of the thinner parts of the deposit, and the bulges contain poorly defined core segments of massive quartz and blocky perthite. The perthite masses are light green to white, and some are as much as 10 in. in diameter. The feldspar in the outer parts of the deposit is chiefly chalky white plagioclase, which is cut by veinlets of gray quartz and fine-grained green muscovite. Some quartz and perthite occur in graphic intergrowths.

In addition to the abundant black tourmaline, the accessory minerals include garnet, biotite, apatite, beryl, pyrite, pyrrhotite, chalcopyrite, columbite, gummite (?), autunite, calcite, and malachite. The rudely faced tourmaline crystals, some of which are 8 in. long and 3 in. in diameter, are cut by veinlets of quartz. Both fine-grained tourmaline and garnet occur with quartz as subgraphic intergrowths. Biotite, which is not common, occurs in thin books as much as 3 in. across. Crystals of reddish-brown garnet and bright-green apatite are scattered sparsely through the deposit, and much garnet is associated with clusters of bright-green sericite flakes. Small blebs of a bright-yellow to bright-green uranium mineral (gummite?) occur with muscovite.

An unusual mass of pegmatite that was mined in the north end of the south cut is said to have been about 4 ft in diameter. It consists chiefly of garnet crystals and granular apatite, with beryl, columbite, and pyrite, all of which are enclosed in a shell of massive quartz. Films of calcite and malachite were noted, and chalcopyrite is reported. The apatite and pyrite appear to have crystallized later than the quartz, garnet, and beryl, and much of the sulfide occurs in vuggy granular aggregates. A few small grains of columbite are associated with the pale yellow-green beryl. The beryl crystals, some of which are 3 in. in diameter, are cut by veinlets of quartz and are coated with fine-grained muscovite and tiny flakes of autunite.

The pegmatite exposed in the north workings consists of medium-grained quartz, feldspar, and muscovite, with tourmaline and garnet. The largest body there contains quartz and feldspar in a 1:1 ratio, and a 2-in. selvage of small muscovite books is present along the hanging-wall contact. A diabase dike strikes northwest, dips steeply to moderately southwest, and ranges

in thickness from 7 to 15 ft. It appears to split into two branches northwest of the north cut. The rock is dense, greenish black, and fine-grained, with a felted texture.

Small flakes and books of mica are present in all the pegmatite bodies, but commercial concentrations appear to be confined to the thicker parts. The richest concentration was observed at the south end of the north cut, where 18 books were 5 in. in average diameter. The mica is concentrated in the outer parts of the bulges, both along the walls and near the margins of the coarse-grained core segments. The largest observed book was 10 in. in diameter.

The mica is very light pinkish buff to cinnamon brown, and most is hard and free splitting. The principal defects are cracks and a slight warping. Little "A" structure is present, but flattened inclusions of tourmaline and quartz are abundant. The general quality of the mica is good. It seems probable that only the thicker parts of the deposit can be satisfactorily worked and that the future of the mine therefore depends upon the number and extent of the remaining bulges. The deposit has yielded moderate quantities

of good sheet mica, and profitable operations probably could be resumed during periods of relatively high prices.

SOUTH AMPHLETT PROSPECT

The South Amphlett prospect, which is 800 ft southwest of the main Amphlett mine workings, is on the property of the Standard Pyrite Co. The deposit was leased to A. W. Amphlett, of Ball Ground, who explored it in 1944 over a strike distance of 195 ft by means of two shallow trenches (fig. 140). Diamond-drill hole exploration was done in December 1944 by the U. S. Bureau of Mines.

The concordant pegmatite body, which is 1 to 3 ft thick, strikes N. 50° E. and dips 45° SE. in biotite gneiss that contains garnet and some muscovite. Striations on the hanging-wall contact plunge 38° due east. The pegmatite consists of alternating quartzose and feldspar-rich (plagioclase?) layers. The layered appearance is accentuated by abundant black tourmaline in the quartz. A thin tourmaline-rich selvage occurs along the hanging-wall contact. As traced to the northeast, the deposit becomes markedly quartzose and

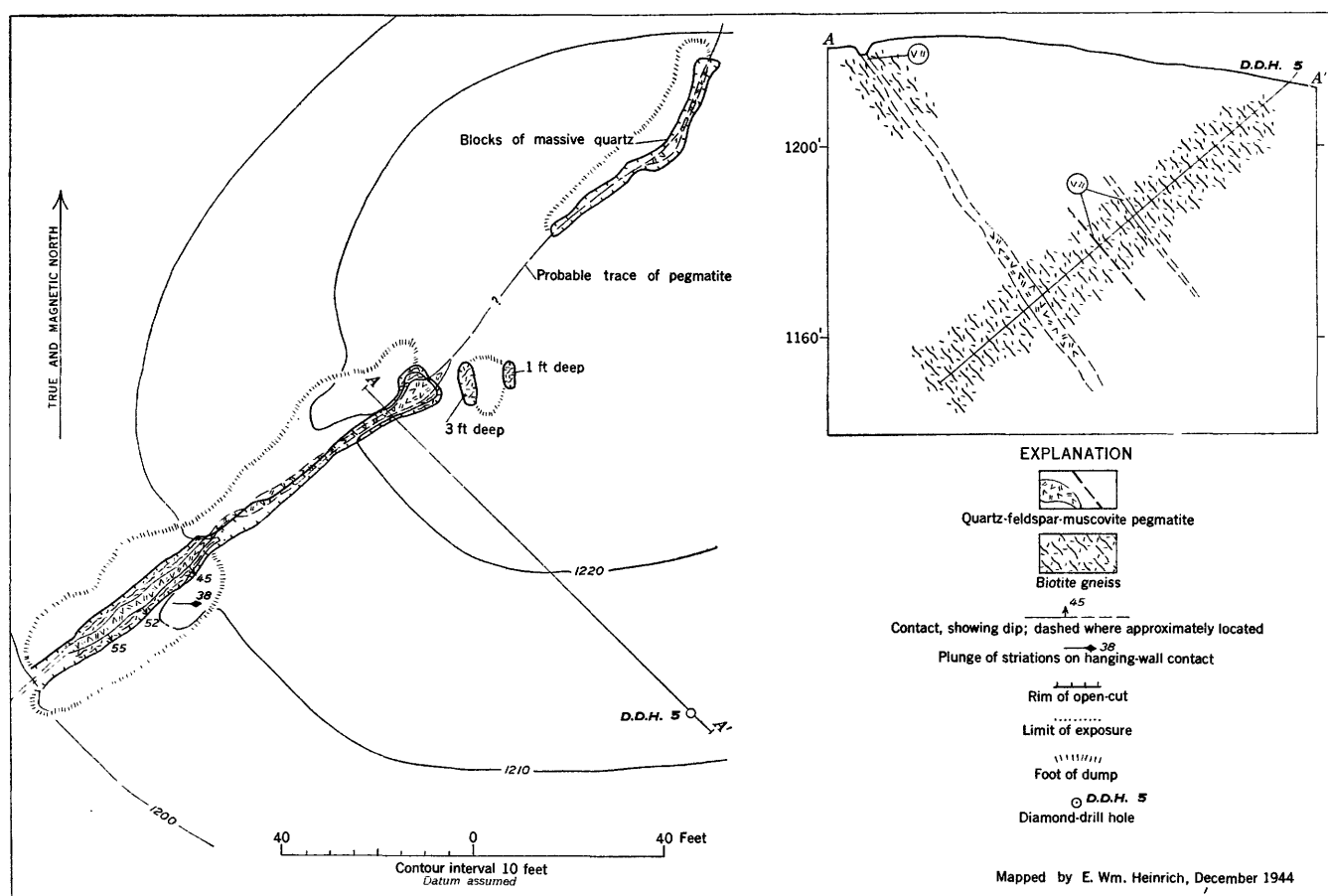


FIGURE 140.—Geologic map and section of the South Amphlett prospect, Cherokee County, Ga.

may even contain a core of massive white quartz. The pegmatite penetrated by the diamond-drill hole (fig. 140) contains a 6-in. central unit of coarse perthite, with a concentration of coarse muscovite along its footwall.

The mica, which is clear and light cinnamon brown, occurs in books 4 in. or less in diameter, chiefly along the margins of quartz layers. Though flat and hard, it is marred by abundant persistent cracks. Possibilities for the production of sheet mica appear to be very limited.

OTHER MINES AND PROSPECTS

The information in the following descriptions of additional mines and prospects in Cherokee County was obtained chiefly from the report by Furcron and Teague:

Cook mine.—The Cook deposit, which is 8 miles S. 80° E. of Canton in lot 137, district 2, section 2 (location 26, pl. 39), is owned by Mrs. Elisha Bailey. It was worked in 1907 by the Pittsburg Mica Mining Co. and later by W. J. Cook, but no mining has been done since 1917. The workings comprise a 150-ft incline, a 70-ft drift at the 30-ft level, a 30-ft winze and a 20-ft down-dip stope from the drift, a raise from the drift that connects with an air shaft, and a 22-ft shaft that is connected with the drift by a short incline.

The pegmatite body, which trends N. 35° E. and dips 45° SE., is conformably enclosed by mica gneiss. It is somewhat irregular in shape but in general tapers downward from 10 ft to less than a foot. The book mica is brown, flat, and free splitting. It is black-speckled, and some contains "A" structure. Cook shipped 4,500 lb of finished mica from the deposit. This material ranged from punch mica to 5-by-7-in. sheets.

The Works Projects Administration prospected a ridge northeast of the mine for a distance of half a mile by means of many shallow trenches. Only thin stringers of burr-rock pegmatite were exposed in the openings, which were dug in 1942.

J. F. Hillhouse prospects.—Three pits were sunk by the Toonigh Mica Co. in lot 521, district 15, section 2, about 1 mile northeast of Toonigh (location 29, pl. 39). The deposit, which is 6 to 8 ft thick, strikes N. 40° to 50° E. and dips 60° to 80° SE. It contains inclusions of mica schist and lenses of quartz that are fringed with book mica. A 25-ft shaft that was sunk in the northeast pit, a quarter of a mile northeast of the Hillhouse residence, connects with a 60-ft incline. About 7 tons of "A" mica was obtained from the openings. Some books were as large as 10 by 14 in. and weighed as much as 50 lb.

A small opening was made in lot 521 between the railroad and the old Holly Springs-Toonigh road. A 6-ft pegmatite sill, which strikes N. 45° E. and dips 66° SE.,

contains mica of scrap quality. Another small pit was dug about 1942 by Hillhouse at a point near the center of lot 449. It exposes a 2-ft pegmatite sill that strikes N. 57° E., dips 68° SSE., and contains thin inclusions of schist. The pegmatite minerals are feldspar, quartz, and clear, light brown mica. The books are small, hard, and flat. About 3,000 lb of scrap mica and 70 lb of punch were obtained.

M. M. Cole mine.—A deposit on the old Cole property, 1.3 miles N. 25° W. of Toonigh (location 31, pl. 39), was prospected prior to 1915 by Charles Makepeace, of Ball Ground. It is owned by E. M. Candless, of Canton. A series of pits and tunnels trends N. 30° E. for 350 yd. At the northeast end of the area two tunnels extend westward into the hill at stream level. They are 30 ft apart at the surface but curve and intersect 50 ft from the portals.

The deposit strikes N. 34° E. and dips 82° ESE. in biotite gneiss. The gneissic structure strikes N. 31° E. and dips 45° ESE. The dike contains a quartz core and abundant book mica. The books are light brown to brownish olive and free splitting but are cracked, ruled, and heavily speckled by magnetite.

Wacaster mine.—A mica deposit in lot 419, district 15, section 2, at a point 1.2 miles S. 40° W. of Holly Springs (location 30, pl. 39), was opened in 1920 by C. M. Wacaster and worked intermittently until 1926 for the Tri-State Mica Co., of Chicago, Ill. The property is owned by J. R. Barbour, of Cincinnati, Ohio. The main old workings, which are filled, include a 60-ft shaft, a 24-ft crosscut that extends northeast from the shaft bottom, and 60 ft of drifts. A shallow 95-ft drift was later driven from a pit to the northwest. The mica is greenish to brownish, spotted, and somewhat wavy. Some books are very large; one measuring 7 by 14 in. and weighing 36 lb was obtained during the operations.

About a quarter of a mile southwest of the Wacaster residence, a pit exposes a mass of pegmatite that strikes N. 35° E. and dips 67° SE. Sheets of mica as large as 2 by 4 in. have been trimmed from books obtained in this opening. Another pit was dug in pegmatite a short distance southwest of the main workings, near the southwest corner of the lot. The deposit, which dips 60° SE., contains feldspar, small lenses of milky quartz, and small books of ruled mica. A thick quartz core is present southwest of the pit. In the northeast corner of the lot and northeast of the mine workings, a pit 40 ft long, 15 ft wide, and 10 ft deep was sunk in pegmatite rich in kaolinized feldspar.

J. D. Hillhouse mines.—An open-cut 75 ft long and 40 ft wide, which is in lot 599, district 15, section 2, and is 1.7 miles N. 45° W. of Toonigh (location 32, pl. 39), exposes three pegmatite sills that are 10 to 15 ft apart.

A little mining was done in this cut in 1941. The pegmatite bodies, which are 2 to 3 ft thick, strike N. 36° E. and dip 65° SE. They contain coarse gray to pink feldspar, burr rock, and lenses of white quartz that are fringed with mica books. The mica, which is light brown and hard, is curved, cracked, locky, and spotted. Books as large as 4 by 6 in. were found.

A drift at the level of the branch on the property was run N. 40° E. for a distance of 65 ft from a point 250 ft northeast of the open-cut. The dumps contain blocks of massive white quartz that are fringed with mica books 4 in. or less in diameter. A 10-ft pit was sunk about 1942 at a point west of the old open-cut, but only biotite and some small books of cracked, ruled, and spotted muscovite were obtained.

Another open-cut, which is 25 ft wide and 60 ft long, was excavated about half a mile southwest of the main cut in 1941. It exposes two parallel pegmatite sills that strike N. 40° E., dip 65° SE., and are separated by 6 ft of mica schist. The southeast sill is 6 to 7 ft thick, and the other is 4 ft thick. Both contain cores of massive white quartz as much as 4 ft thick and core-margin concentrations of mica. The mica books are brown, cracked, and curved and contain some spots.

In 1941 a plant for washing scrap mica was built on Toonigh Creek near the old W. M. Roberts residence, and 2 carloads of mica that is said to have been obtained from the Hillhouse mines was a part of the mill feed.

Dean mine.—Two pegmatite dikes, which are 1.7 miles S. 78° W. of Toonigh in lot 711, district 15, section 2 (location 33, pl. 39), were first explored in 1889, when the property was owned by C. W. Flentke, of Evansville, Ind. They were worked in 1942 by J. L. Neil, who recovered scrap mica in a small washing plant near Toonigh. The opening is a T-shaped cut. The cross of the "T" is about 50 ft long, and the stem is 115 ft long and trends N. 29° W.

The pegmatite bodies, which are separated by 10 ft of country rock, strike N. 40° E. and dip southeast. The northwest dike is 3 to 4 ft thick and contains weathered feldspar, quartz, and muscovite in books as large as 3 by 4 in. Most of the mica, which is badly clay-stained and ruled, occurs along the hanging-wall contact. The southeast pegmatite body, which is 10 to 15 ft thick at the bottom of the cut and thins upward, contains mica books 3 in. or less in diameter along the hanging-wall contact. The mineral is brown, cracked, ruled, and generally spotted.

Hause mines.—A deposit on the old B. D. Hause property, which is on the north side of the Little River and 1 to 1¾ miles west of Toonigh (location 34, pl. 39), is owned by the Georgia Power Co. and was worked by T. K. Flentke, of Evansville, Ind., and a Mr. Make-

peace, of Ball Ground. Near the tenant house is a series of old pits and cross-cuts that trends N. 47° E. for 300 ft. The pegmatite body is several feet thick and contains abundant hard, small books of spotted brown mica that is wavy, cracked, and ruled. Old crosscuts and inclines southwest of these workings probably are in the same pegmatite body.

About a third of a mile S. 44° W. of the house are two old open-cuts. One is 150 to 200 ft long and trends N. 23° E. It connects with a 60-ft cut that is elongated about N. 65° W. Higher on the hillside a 3-ft pegmatite body is exposed in a pit, where it strikes N. 15° E. and contains a central inclusion of schist.

An old pit that is 20 to 40 ft wide and 20 ft deep was sunk in lot 639 on the northwest side of Toonigh Creek. It exposes two vertical pegmatite bodies that strike N. 55° E. and are separated by 10 ft of schist. The mica, which occurs in books as large as 5 by 6 in., is hard and somewhat spotted.

C. M. Wacaster prospected an 8-ft pegmatite body in a field half a mile north of the tenant house and on the north side of Toonigh Creek. It strikes N. 50° E., dips 40° NW., and contains a 4-ft core of quartz. The wall zone consists of quartz, feldspar, muscovite, and biotite books as much as 3 in. in diameter. Most of the muscovite, which is clear and brown, occurs along the footwall of the core. Flat books as large as 6 by 8 in. have been obtained. Early in 1943 Frank D. English sank a 30-ft incline to the southwest. The pegmatite body, which ranges in thickness from 6 to 13 ft, contains schist inclusions, as well as a 4-ft quartz core that is flanked by mica concentrations. Mica valued at about \$2,000 is said to have been recovered.

Kuykendall prospect.—Several pegmatite sills that trend N. 45° E. have been prospected on the R. A. Kuykendall farm, which is north of the old Alabama road and 3 miles S. 80° W. of Woodstock (location 36, pl. 39). A small pit was dug in 1922 at a point a quarter of a mile N. 10° E. of the farmhouse. The mica in the deposit is cracked, bent, and spotted, and some is marked by "A" reeves. In 1942 B. T. Tuggle sank a 36-ft shaft on the hill near the house, but no pegmatite was encountered.

J. V. Ledford mine.—The Ledford deposit, which is on a branch of Tate Creek about 100 yd south of an old sawmill, is 3.2 miles S. 63° W. of Woodstock (location 37, pl. 39). It is said to have been opened about 1860 by Bill Hunter and Walter Ray. A 35-ft drift was later driven by a Mr. Wagster. The mine was leased in 1942 to Frank B. English and E. N. Clapp, and in 1943 to Fowler and Carbone. The workings, which include an open-cut and a drift, expose a pegmatite body that strikes N. 46° E. and dips 66° SE. A quartz core

is 3 to 5 ft thick, and the rest of the pegmatite consists chiefly of feldspar, graphic granite, and muscovite. The mica is hard and brownish. Some is spotted. A 12-by-18-in. book and a 75-lb book have been obtained.

Waltz and Bates (Iza Clayton) mines.—Much mining was done in 1926 and 1927 by Wacaster and Goff on the old Holcomb property, which is in the southeast corner of Cherokee County 7.4 miles S. 75° W. of Cumming (location 38, pl. 39). The property, which is owned by Carl Waltz, of Cincinnati, Ohio, includes lot 174 and parts of lots 173 and 115, district 2, section 2. The mine workings are on both sides of the county road.

The western part of the deposit has been most extensively developed, chiefly by means of two shafts and an open-cut 50 ft long and 15 ft deep. These workings, which constitute the Bates mine, expose a pegmatite body that strikes N. 30° E. and dips west-northwest in hornblende gneiss. The main shaft was sunk 51 ft through old workings, and from its bottom at the 61-ft level drifts were run north and south for distances of 10 to 12 ft. The pegmatite body in these workings is 6 ft thick, strikes northeast, and is nearly vertical. Spotted greenish to brownish mica occurs in flat books as large as 3 by 4 in., and some biotite is present.

About 800 ft east of the Bates workings, a trench 30 ft long, 10 ft wide, and 10 ft deep marks the site of an old 25-ft shaft with a 15-ft drift to the north and a 30-ft drift to the south. The vertical pegmatite body strikes N. 15° E. and is 4 ft thick. It tapers to a few inches about 5 ft south of the shaft and beyond that point swells to 6 ft, but at the end of the drift it is cut off by a fault. Most of the mica occurs along the walls.

A shallow pit about 400 ft northeast of the caved shaft exposes a vertical pegmatite body that strikes N. 15° W. and is 3 ft thick. It contains clear "A" mica. On the east side of the road are two pits and a caved 20-ft shaft with a short drift to the north. The pegmatite sill, which is at least 5 ft thick, dips 50° NE. A crosscutting offshoot is 1½ ft thick and strikes N. 40° W. The deposit contains some massive quartz, and greenish mica is distributed sparsely throughout the wall zone. Ruled "A" books as large as 6 by 10 in. have been obtained, and cracked sheets as much as 2 in. in diameter are present on the dumps.

About 600 ft southwest of these workings and on the west side of the road, a small pit exposes a pegmatite body that probably strikes northwest and dips northeast. Some large "A" books of tangled mica have been found.

G. W. Anderson prospect.—A cut 20 ft long was excavated about 1940 in a deposit 1 mile due north of Arnold and a quarter of a mile S. 24° W. of the Big

Spring Camp Ground. It was filled in 1942 by Works Projects Administration employees, who sank a 20-ft shaft near its head. The pegmatite body, a sill that strikes N. 70° E. and dips 25° SSE., is enclosed by garnet-mica schist with minor hornblende layers. The mica is marked by "A" structure, but 2-by-3-in. trimmed sheets have been obtained. About 100 yd to the east a 15-ft shaft exposes a pegmatite body in which a thick lens of milky quartz is flanked by a mica-rich zone. The wedge-A mica is ruled, cracked, and spotted.

J. T. Haley mine.—A deposit on the property of Mrs. J. T. Haley, 1 mile south of Old Fort Buffington and 6½ miles east of Canton (location 25, pl. 39), was prospected many years ago, chiefly by means of several pits. In 1942 W. T. Hippy drove a crosscut N. 40° E. for 160 ft to intersect an old shaft. The pegmatite dike trends N. 70° E. in coarse-grained biotite gneiss. The country-rock foliation strikes N. 38° E. and dips 66° SE. Most of the book mica is tied, warped, cracked, and marred by ruling and wedge-A structure. Some is spotted.

R. M. Reece prospect.—A small pit a quarter of a mile S. 55° W. of the R. M. Reece residence and 1 mile east of Holly Springs (location 28, pl. 39) was dug in the summer of 1942. The deposit, which is 4 ft thick, consists of interlayered mica schist and stringers of pegmatite that strike N. 46° E. and dip 68° SE. The mica is ruled, warped, and cracked, and much of it contains "A" structure. Many books are small and heavily stained.

Bennett (Mica Field) mine.—The Bennett deposit, which is 1½ miles south of Bethany Church and 5.6 miles S. 85° W. of Nelson, is in lot 229, district 13, section 2 (location 39, pl. 39). Some prospecting was done many years ago, and about 1918 J. E. Burleson excavated a series of pits and shafts. A parallel group of workings to the southeast probably was intended to intersect down-dip parts of the deposit.

The country rock, a biotite gneiss, conformably encloses a pegmatite body that trends N. 15° E., dips 40° ESE., and probably is 3 to 5 ft thick. The dumps contain blocks of milky quartz, masses of kaolinized feldspar, and weathered books of mica 6 in. or less in diameter. The mica is flat and clear but is cracked, ruled, and wavy. A 60-lb crystal of beryl is said to have been found.

Cochran mine.—The Cochran deposit, which is in lot 294, district 2, section 4, is 2 miles west of Centerville and 2½ miles N. 78° E. of Ball Ground (location 22, pl. 39). It was first worked in 1933 by J. Hines Wood, of Canton, and the Georgia Mineral Products Co., of Holly Springs. Six shafts were sunk by the Works Projects Administration in 1941. Other work-

ings include two trenches and an open-cut about 600 ft west of the house. The cut trends east and is 60 ft long, 25 ft wide, and 10 ft deep. Five of the shafts are in the northeast corner of the mine area, and the sixth is on the southeast side of the access road 260 ft east of the cut.

The pegmatite body is unusually large and may be as much as 200 ft thick in some places. A prominent quartz core that trends N. 80° E. crops out near the tenant house and thickens westward to form a distinct ridge that can be traced for at least a third of a mile southwest of the house. Concentrations of mica flank the core, especially on the south side, and are thickest in an open-cut. Most of the mica is scrap. Book mica and beryl occur near the south wall of the deposit near the tenant house.

The pegmatite body, which appears to be vertical, trends northeast in coarse quartz-muscovite schist and muscovite-biotite-garnet schist. The country-rock foliation trends N. 70° E. and dips steeply SSE. In one of the small pits southeast of the shaft group the wall rock is a schistose conglomerate in which "stretched" pebbles occur. The pegmatite contains white, smoky, and faintly amethystine quartz, coarsely kaolinized feldspar, and black tourmaline, muscovite, and beryl. The tourmaline, which occurs in muscovite-sheathed crystals as much as a foot in diameter and 3 ft long, is marked by quartz-filled cross fractures and muscovite-filled longitudinal fractures. Beryl crystals are said to be locally abundant.

At least 36 tons of mine-run mica, nearly all scrap, and 200 lb of beryl have been taken from the mine. The mica is light-colored and clear but is marred by warping and in part by ruling and "A" structure. Inclusions of black tourmaline also are present. Books as large as 6 by 8 in. occur. The deposit does not appear to have been thoroughly prospected and may hold some promise as a source of scrap mica with sheet mica and beryl as byproducts.

Revis deposit.—A pegmatite body that is at least 300 ft long crops out 250 ft southwest of the Revis residence, which is on the Centerville-Fourmile Church road 3¾ miles N. 52° E. of Ball Ground (location 21, pl. 39). It strikes N. 78° W., dips south, and is 2 ft thick in the road cut. It consists of quartz, kaolinized feldspar, muscovite, and black tourmaline. Flat sheets of clear, hard mica as large as 2 by 3 in. have been found.

S. S. Densmore prospect.—The Densmore deposit, which was discovered in 1916 and last worked in 1937, is 1.1 miles S. 25° E. of Fourmile Church and 3.6 miles S. 82° E. of Nelson (location 20, pl. 39). The openings include a 10-ft pit 200 ft southeast of the Densmore residence and a small pit at the edge of the woods and 100 ft

southwest of the first. The pegmatite body, which strikes N. 10° E. and dips 70° E., contains heavily stained "A" mica that is chiefly of scrap grade.

Information on the following prospect in Cherokee County was obtained from the report of Sterrett (1923):

De Lay prospect.—A small prospect pit was dug prior to 1914 on the De Lay property, 3 miles west of Woodstock (location 35, pl. 39). The pegmatite body, which is enclosed by mica gneiss that strikes northeast, contains a core of quartz and concentrations of core-margin mica. The "A" books, some as much as 10 in. in diameter, would yield 1½-by-4-in. trimmed sheets. Some of the mica is specked.

The Colonial Mica Corporation provided the information on three deposits in Cherokee County:

F. M. Williams prospect.—At the Williams prospect, 2 miles southeast of Ball Ground (location 24, pl. 39), an irregular body of medium-grained pegmatite 12 ft in maximum thickness is exposed. It contains warped, tied mica books 2½ in. or less in diameter.

J. B. Wheeler prospect.—Several pits and shafts were sunk about 1890 on the J. B. Wheeler property, 2 miles east of Holly Springs (location 27, pl. 39). The group of workings trends N. 35° E. for 75 ft. A 25-ft shaft lies southeast of the pits. The nearly vertical pegmatite body, which strikes northeast and is at least 6 ft thick, is conformable with the enclosing mica gneiss. Its dip is not known. The mica is clear and light-colored and occurs in books as much as 6 in. in diameter. Several wedge-A books have been plowed up in a field a quarter of a mile to the west.

Liner mine.—The Liner deposit is owned by Lester Smuthers, whose residence is on Thickety Road 2 miles from Canton. Beryl is reported from a nearby locality.

The following mines and prospects are in Pickens County. The descriptions were obtained chiefly from the report by Furcron and Teague (1943).

J. L. Mullinax prospect.—The Mullinax deposit, which is 1½ miles S. 87° E. of Antioch Church and 1 mile S. 25° W. of Talking Rock (location 5, pl. 39), has been worked at various times since 1917. The main opening is a trench about 80 ft long and 15 ft in maximum depth. The pegmatite body, a 4-ft dike that strikes N. 19° W., consists of quartz, kaolinized feldspar, and muscovite. The mica is greenish and clear but ruled, tied, and marked by "A" structure. The country rock is a graphitic quartz-mica schist whose foliation strikes N. 27° W. and dips 10° to 20° ENE.

W. J. Garrison property.—The Garrison deposit is on the Fairmont highway 3.5 miles west of Jasper (location 6, pl. 39). One outcrop on the east side of a small branch of Talking Rock Creek was prospected many years ago and is said to have yielded good flat

pieces of mica as much as 5 in. across. The mica now showing is somewhat twisted and shattered. Partly kaolinized feldspar and a little mica in sheets as much as 6 in. in diameter have been encountered in the plowed field on the west side of the creek.

W. P. Stancil prospect.—A small pit on the north side of a road $2\frac{3}{4}$ miles N. 60° W. of Tate (location 7, pl. 39) was dug in pegmatite that contains books of mica $1\frac{1}{2}$ in. or less in diameter. The deposit is in lot 91, district 13, section 2.

Allen Morton prospect.—Two pegmatite dikes were prospected by means of shallow pits in lots 122 and 123, district 12, section 2, at a locality 3.5 miles S. 10° W. of Jasper (location 8, pl. 39). One of the dikes appears to trend N. 15° E. in quartz-mica schist with well-developed foliation that strikes N. 35° E. and dips 70° SE. The pegmatite contains kaolinized feldspar, quartz, and very small, warped, cracked, and tied books of clear mica. A 15-ft exposure of pegmatite in a stream bed an eighth of a mile to the north contains feldspar of good quality and mica books 2 in. or less in diameter.

About an eighth of a mile south of the Morton deposit a little prospecting was done in a pegmatite outcrop near another stream. Massive quartz crops out on the ridge to the east.

Davis mine.—A mica deposit on the Marion Davis farm, which is $4\frac{1}{2}$ miles slightly west of south from Jasper (location 9, pl. 39), was prospected prior to 1909. The nearly vertical pegmatite body, which strikes N. 10° E. and is 4 ft thick, contains graphic granite and some muscovite. On a low ridge half a mile to the west an open-cut 60 ft long exposes a 10-ft pegmatite body that strikes nearly north. It is rich in kaolinized feldspar and fine-grained mica. An old prospect opening near a ravine bottom and three-eighths of a mile south of the cut exposes 10 ft of pegmatite that consists of unweathered white feldspar, quartz, muscovite, and garnet. The deposit strikes nearly north.

C. C. West prospects.—Several pegmatite deposits on the W. C. Sellers property, which is in lot 13, district 13, section 2, at a point $3\frac{1}{2}$ miles S. 65° W. of Tate (location 10, pl. 39), were first worked by C. C. West many years ago. A 5-ft pegmatite body was exposed in old prospect openings, where it strikes N. 15° E. and dips 50° ESE. in garnet-mica schist. Another 3-ft body, once exposed in old workings 300 ft to the east, strikes N. 20° E. and contains books of mica 3 to 5 in. in diameter. Some massive quartz is present in both pegmatites. In 1942 a small pit was dug in a 4-ft pegmatite sill that strikes N. 29° E. and dips 56° ESE. in biotite gneiss. It contains clear, greenish "A" mica.

Denson mines.—The S. A. Denson deposit, which is in district 12, section 2, at a point $4\frac{3}{4}$ miles due west of Nelson (location 11, pl. 39), was opened by L. Green, of North Carolina, about 1890 and was mined in 1920 and 1921 by J. E. Burleson. About 33 bbl of flat brown mica was obtained. The workings, which are in lot 203 and about 100 yd west of the house, include an open-cut that originally was 25 ft deep and several nearby pits 18 to 30 ft deep. The 10-ft pegmatite body appears to strike east and to dip moderately south. It contains massive quartz, feldspar, and muscovite. The mica is of good quality.

A pegmatite body that strikes north and dips west was once exposed in an old pit northeast of the house. It is 10 ft in average thickness but locally is as much as 20 ft thick. It contains a quartz core. Two small pits about a quarter of a mile N. 15° E. of the house expose a 3- to 6-ft pegmatite sill that strikes N. 20° E. and dips 45° ESE. The mica is brown, clear, and hard and contains some "A" structure. The largest sheets are said to have been 5 in. across.

About 300 yd northeast of the two pits are several openings that were sunk to a depth of 20 ft by Denson. About 2,000 lb of mica was obtained from a pegmatite body that dips 45° E. and is 1 to 3 ft thick. Some of the mica is marked by "A" reeves and much is of scrap grade. One flat, 60-lb book, however, is reported. Fragments of massive kyanite have been found in adjacent fields.

Green mica was mined in 1928 on the adjoining Austin Blan property, where a 3- to 6-ft thickness of quartz crops out for a strike distance of about 700 ft. Crystals of light-green beryl as much as 2 in. in diameter are reported.

Cagle (Dunsmore) mine.—The Cagle deposit, which is in lot 195, district 13, section 2, is 4.8 miles S. 65° W. of Tate (location 12, pl. 39). It was prospected prior to 1904 and was mined by J. E. Burleson in 1918 and by a Mr. Maxwell in 1944. It is owned by the Colonial Mica Corporation. A quarter-mile series of pits exposes a pegmatite dike that strikes N. 10° E., dips east, and is 5 ft in average thickness. The foliation of the biotite gneiss and hornblende gneiss country rock strikes N. 6° E., and dips 68° E.

At the northeast end of the area an 18-ft incline was sunk to connect with an older 25-ft vertical shaft and a crosscut was driven from the bottom of the shaft. Two 5-ft pegmatite bodies strike N. 15° E. and dip 55° ESE. They contain thick pods of massive quartz with associated wedge-A mica. Flat mica occurs in the wall zones, and books as large as 12 by 18 in. have been obtained. The principal defects are small mineral specks and minute crystals of biotite. Garnet crystals 2 in. in

diameter, rutile crystals an inch or more in diameter, and some large, clear crystals of quartz have been found in the soil near the deposit.

Poole mine.—Mica was discovered about 1885 in a deposit 0.6 mile S. 65° W. of the old Holcomb Post Office and 5¾ miles S. 85° E. of Tate (location 13, pl. 39). J. E. Burleson worked the mine in 1918. The openings include several old pits, an inclined shaft, and a 75-ft crosscut that extends into the hillside just about at the level of the branch. The poorly exposed pegmatite body appears to strike N. 35° E. and dip 35° SE. The dumps contain spotted mica books that are bent but free splitting. Sheets 5 by 6 in. in size are reported.

James Foster prospect.—Several pits were dug about 1920 on the J. M. Pyyon property, which is three-eighths of a mile west of the Marble Hill School in lot 64, district 4, section 2 (location 14, pl. 39). Later some prospecting was done by James Foster, and two small pits were dug about 1942 by Jim Dover. Mica books, fragments of quartz, and crystals of black tourmaline are scattered over an elongate area that trends N. 65° W. Apparently they were derived from a pegmatite body that may be as much as 100 ft thick. The mica is clear and flat, but many of the books are tied and cracked. Trimmed sheets as large as 2 by 3 in. could be obtained. The country rock, a mica-garnet schist with small lenses of amphibolite, strikes N. 62° E. and dips 40° SSE.

Howell mine.—A deposit on the Dillard Howell and Frank Coggins property, which is 1½ miles south of Marble Hill in lot 144, district 4, section 2 (location 15, pl. 39), was prospected in 1930 by M. L. Baxter, who dug several pits and an incline. In October 1942 English and Clapp reopened the 60-ft Baxter incline and extended it 25 ft. The pegmatite body, which trends N. 45° E. and dips 45° to 60° SE., is 4 to 5 ft thick. A quartz core 3 ft in maximum thickness is flanked by a wall zone of kaolinized feldspar and muscovite. Some inclusions of mica schist are present. Smaller bodies of feldspathic pegmatite occur on both sides of the main deposit. The mica is light brown and is curved, cracked, ruled, and clay-stained. The largest observed book was 14 in. in diameter.

G. W. Worley deposit.—A little prospecting on the G. W. Worley property, which is 1½ miles south of Marble Hill and half a mile southwest of Old Amicalola (location 15, pl. 39), in lot 142, district 4, section 2, disclosed mica books 3 in. or less in diameter. These occur in several pegmatite bodies that strike N. 35° W. and dip northeast.

May Davis prospect.—The May Davis deposit, which is half a mile south of the Howell mine and 1½ miles west of Federal School (location 16, pl. 39), was opened

about 1900 by means of a 10-ft pit. Additional prospecting was done about 1942 by a Mr. Owens of Dahlonega. The pegmatite body, which strikes N. 45° E. and dips 40° SE., contains 4-in. layers of quartz near the hanging wall. Much "A" mica, chiefly of scrap grade, is present in the dumps.

Partain prospects.—Several prospects 5½ miles due east of Tate in lot 138, district 4, section 2 (location 19, pl. 39), are owned by G. W. Duncan, of Marble Hill. The deposit was worked on a small scale by J. E. Burleson about 1918. One small pit is a quarter of a mile N. 50° W. of the Partain house, and another is south of the road and a quarter of a mile west of the house. In 1932 a small cut was excavated on the crest of a ridge north of the road. The workings appear to be on three separate but probably parallel pegmatite bodies that strike N. 75° W. and dip 45° SSW. The mica schist country rock contains kyanite, staurolite, and garnet. The mica books in the pegmatites are 3 in. or less in diameter and are brownish, heavily specked, warped, and cracked.

Reynolds mine.—Two pegmatite dikes were mined in 1932 by Boggs and Wacaster on the property of Mrs. Emily Reynolds, which is a quarter of a mile N. 20° W. of Federal School, at the junction of Dug Road and the old Federal road. The dikes strike N. 35° E. and are separated by 30 ft of mica gneiss in which a nearly vertical foliation strikes N. 55° E. Tourmaline and small books of muscovite occur in the gneiss near the pegmatite contacts. The west dike contains a 6-ft quartz core and much core-margin mica. The east dike is about 10-ft thick and contains a 3-ft quartz core near the footwall. It is nearly horizontal but "rolls" with depth to dip steeply east-southeast. Tourmaline and biotite are accessory minerals. All the workings are now filled, but flat, clear sheets of mica 2 in. or less in diameter occur in the dumps.

Wilkie prospects.—The property of I. R. Wilkie, which is 1¼ miles S. 40° E. of Dug Gap, was prospected for mica in 1941 by a Mr. Pitman. A small pit near the barn exposes a pegmatite dike that strikes N. 34° W. and consists chiefly of quartz with a few hard, flat books of light brown, specked mica. The country rock is a sillimanite-bearing mica-garnet gneiss with foliation that strikes N. 70° W. and dips steeply north-northeast. A trench an eighth of a mile S. 34° E. of the pit exposes a quartzose pegmatite that contains tourmaline and muscovite. The mica, which is clear but bent and ruled, occurs in books 2 by 3 in. or smaller.

C. H. Fouts deposit.—Four-inch books of clay-stained mica are reported to have been found in a field near the Dug Gap-Fourmile Church road 1 mile south

of Dug Gap. The deposit is on the C. H. Fouts property.

A. V. Reeves prospect.—A 15- to 20-ft shaft was sunk by Elmer Bennett during the period 1920-22 on property $1\frac{1}{4}$ miles west of Cagle School and 5 miles northwest of Nelson. Sheets of mica as much as 4 in. in diameter are present in the dumps. Some contain "A" structure and a few black specks.

J. F. Carney prospect.—Two sacks of mine-run mica was obtained from a small prospect opening in lot 229, district 12, section 2, which is 1 mile S. 30° E. of Bethany Church and near the Cherokee County line. Boulders of kyanite occur in the soil near the pit.

Jones (Bozeman) mine.—Mica books weighing as much as 12 lb have been mined from a deposit in lot 181, district 4, section 2, at a point 2 miles S. 45° W. of Dug Gap. It was first worked about 1890 and was operated by J. E. Burleson in 1918 and 1919. Later W. H. Bozeman and J. S. Wood sank a 35-ft shaft in the northeastern part of the area, and in 1941 a Mr. Pitman sank a 20-ft shaft near the southwest end of the deposit and drove a crosscut from this opening. During the summer of 1942 Frank English and E. M. Clapp sank a third shaft midway between the other two, drifted 15 ft to the northeast, and sank a 25-ft down-dip incline from the bottom of the shaft.

The pegmatite dike, which may be as much as 7 or 8 ft thick, strikes N. 60° E. and dips 40° SSE. in biotite gneiss. The country-rock foliation strikes N. 30° E. and dips 20° ESE. The deposit contains a persistent quartz core, and quartz, kaolinized feldspar, biotite, black tourmaline, and muscovite are present in the dumps. Beryl is reported. The mica is brownish and hard, but much of it contains black spots.

An 8-ft shaft and a 20-ft drift were dug by Burleson about an eighth of a mile southwest of the mine workings. Other openings include several small trenches and an incline with an appended 10-ft drift. The pegmatite body, a 5-ft sill that dips 35° SE., contains clear, brown mica that is bent and cracked. Small books of biotite are abundant.

The Colonial Mica Corporation provided information on two additional deposits in Pickens County:

Fowler and Freeman prospects.—A deposit on the Burgess Fowler and John Freeman properties, which lie on a north-south ridge east of Long Swamp Creek and 2 miles east of Nelson (location 17, pl. 39), was prospected prior to 1913. The concordant pegmatite body, which strikes N. 35° W. in mica schist, is 3 to 4 ft thick and at least 300 yd long. Mica is abundant. It occurs in books as large as 6 by 8 in. and contains inclusions of tourmaline.

Walker mine.—The Walker deposit, which is on Dug Road 3 miles from Marble Hill and 4 miles east of Nelson (location 18, pl. 39), was last worked by Samuel Ferguson in 1943. Production was small.

FORSYTH COUNTY

Harrison prospect.—A small pit was dug in a mica deposit on the Harrison property, which is a quarter of a mile southwest of Zion Hill Church and 4 miles west of Coal Mountain in lot 381, district 3, section 1. The pegmatite body is 32 ft thick; it strikes N. 30° E. and dips 60° ESE. in garnet-mica schist. Book mica is associated with a lenticular core of milky quartz. The books are brownish, flat, hard, free splitting, and as much as $3\frac{1}{2}$ in. in diameter. Traces of "A" structure and small black specks are present in some sheets.

Hansard prospect.—A pit 30 ft long and 10 ft deep was excavated in pegmatite on the farm of H. D. Hansard, half a mile south of Roanoke Church and 10 miles by road northwest of Buford. The deposit is in lot 62 or 63, district 14, section 1. It is not exposed but probably is conformable with the foliation of the flanking mica schist, which strikes N. 57° E. and dips south-southeast. Hard, brown book mica occurs along the margins of an 18-in. quartz core. The books are slightly curved and cracked and consist chiefly of scrap material. The largest crystals would yield $1\frac{1}{2}$ -by-2-in. trimmed sheets.

Bennett prospect.—Clear mica of punch size was obtained from a small pit on the O. P. Bennett property, which is 1 mile south of the Cumming-Canton highway and 5 miles by road west of Cumming (location 4, pl. 39). The concordant pegmatite body, which is 4 to 5 ft thick, strikes N. 20° E. and dips gently west-northwest in biotite gneiss. Small lenses of quartz are enclosed by mica-bearing feldspathic pegmatite. The mica is hard and light-colored, and most is marked by "A" structure.

McBrayer prospect.—Prospecting was done during World War II in a deposit on the Oscar McBrayer farm, which is 2 miles west of Zion Hill Church and 6 miles west of Coal Mountain. During the spring of 1942 an incline was sunk by Frank B. English in lot 378, district 3, section 1. A little work also was done by Ira Gowans. The pegmatite body, which is 3 ft thick, is conformably enclosed by biotite gneiss. It contains coarse-grained quartz, feldspar, and mica. Greenish wedge-A mica is associated with small pods of quartz, and flat, free-splitting books occur in feldspathic pegmatite. The flat books are light-colored, cracked, and warped. A 150-lb book is reported from the deposit, but most of the mica is scrap.

HALL COUNTY

MERCK (OLD HOPE) MINE

The Merck mine is about a mile beyond the Gainesville city limits at the northwest end of Grape Street. It is owned by Mrs. Ruth Starbuck, of Gainesville, and was last operated from June 1943 until March 1945 by J. A. Rhine, of Atlanta. The deposit was opened in 1890 by a Mr. Reece and was worked in 1912 by a Mr. Jones. Later it was sold to George M. Hope, and still later to E. S. Wessels, of Gainesville. In 1938 a little work was done by George Gowder and Sydney Smith.

The deposit has been opened for a length of more than 500 ft, a width of about 200 ft, and a maximum depth of 104 ft by means of cuts, shafts, and irregular underground workings (pl. 41). In general the older workings are caved or otherwise inaccessible. Most of the mining during World War II was done in lateral workings connected with the deepest shaft. Much difficulty was encountered in spiling through and burrowing around old workings, chiefly interconnected drifts and inclines. An incline was driven down the dip of the pegmatite body that was intersected at the heading of the 74-ft level. The main shaft was deepened from 74 to 104 ft, and the 65-ft Frost crosscut was driven to the pegmatite body. Rhine also mined from an open-cut and a 20-ft shaft near the branch at the south end of the area, but there the pegmatite body was found to pinch out down its dip.

The country rock is medium- to coarse-grained mica schist that trends northwest to north-northeast. Minor variations are common locally, and in several places the rock is much contorted and sheared. The pegmatite occurs as a series of concordant lenses that are 6 ft in maximum thickness and less than 3 ft in average thickness. They are essentially homogeneous aggregates of quartz, kaolinized feldspar, and muscovite. In the deeper workings the rock is unweathered, and perthite and greenish-white plagioclase can be distinguished. Some of the lenses are vitally barren of muscovite, but it is a common constituent in others and tends to be concentrated near the walls. Small cores of quartz occur in the thickest lenses, and most of the quartz is fringed with muscovite books.

Part of the mica occurs as clear to slightly spotted, cracked, and somewhat tangled yellowish to brownish-olive flat A books, but the remainder is hard, clear, and flat. The flat books are brownish olive to light brown. Rhine states that an average of about 4 percent of sheet material can be trimmed from the mine-run books. Some books of unusually good quality, however, are said to have contained 10 to 12 percent recoverable sheet material. The pegmatite mined on the 104-ft level is esti-

mated to contain 7 percent book mica. Books as large as 1 by 1½ ft were obtained from this relatively rich part of the deposit.

Recent operations were hampered by a heavy flow of ground water, especially in the workings from the deepest shaft. The deposit does not appear to have been mined out, and possibilities for further production seem favorable. Further operations should be directed to depths below the 104-ft level and might well involve drifting along the pegmatite lenses mined in the Frost crosscut.

OTHER DEPOSITS

Several pegmatite bodies are reported to occur in the Carolina gneiss along the Gainesville-Dahlonega highway 3½ miles northwest of Thompsons Bridge. Although some are as much as 12 ft in exposed breadth, they are poorly zoned and do not appear to contain mica in commercial quantities.

FRANKLIN COUNTY

The information on the following deposits was obtained chiefly from the report by Furcron and Teague (1943):

Weldon mine.—The Weldon deposit, which is beside the Carnesville road near Fairview Church, is 4 miles southwest of Lavonia (location 1, pl. 39). Three pegmatite bodies that strike northeast have been worked. One contains a large quartz core and moderately rich core-margin concentrations of brownish to greenish mica, much of which is in flat-A books. The deposit is said to pinch out at a relatively shallow depth.

Highway deposits.—Several lenticular bodies of mica-bearing pegmatite are crossed by the Lavonia-Royston highway between Lavonia and Bowersville (location 2, pl. 39). The mica is greenish, and most is marked by "A" structure. The exposures offer little promise for prospecting.

OCONEE COUNTY

GENERAL FEATURES

The mica deposits in Oconee County appear to be concentrated in a northwestward-trending belt that is 10 miles long and 3 miles wide. It lies along the southwestern county line. Many deposits are thin dikes in Carolina gneiss. The only extensive mining has been done in the Dickens deposit, which was opened about 1900 but worked chiefly during 1943 and 1944. A little prospecting was done northwest of High Shoals and southwest of Bishop about 1890 and 1895. Several unprospected pegmatites are exposed along the Central Railroad of Georgia 2 to 4 miles south of Farmington.

DESCRIPTIONS OF DEPOSITS

DICKENS MINE

The Dickens mine, which is in southwestern Oconee County, is most easily reached from the town of Monroe by following U. S. Highway 78 for 18 miles and continuing southeastward over $1\frac{1}{2}$ miles of Georgia Highway 53 and finally southward over nearly 3 miles of a county road. The deposit is owned by L. L. Dickens and is on the old Tom Dickens farm. It is reported to have been opened about 1900, and it was worked in 1943 by Homer Mundy and in 1944 by Ray Ward and Charlie Smith. Mundy resumed operations for several months late in 1944.

The workings include four vertical shafts, two inclined shafts, and a stope 8 ft wide and 20 ft long that was developed from one of the inclined shafts (fig. 141). Other pegmatite bodies north and south of the county road were prospected by means of seven small pits and trenches. Most of the mica was obtained from workings north of the road.

Six pegmatite bodies are exposed, and a seventh is reported. Four of them can be seen in the north mine workings or in cuts on the north side of the road. The other two have been worked south of the road. They strike N. 60° to 75° W. and dip 55° to 80° NNE. They cut across the foliation of the enclosing mica gneiss and schist, which strikes N. 25° to 35° E. and dips 25° to 45° ESE. In most places the pegmatites are $1\frac{1}{2}$ to 4 ft thick. The one exposed in shaft D may have been emplaced along a fault, for the gneissic structure along the footwall is parallel with the contact but strikes N. 65° E. and dips 5° SSE. along the hanging wall.

In general the pegmatites are poorly zoned. The dike exposed in shaft A contains a 2- to 3-in. quartz rib with scattered core-margin concentrations of book muscovite. That in shaft C contains a discontinuous core of massive quartz pods, some of which are flanked by mica concentrations. The wall zones consist of gray perthite, white kaolinized plagioclase, quartz, muscovite, biotite, and accessory tourmaline and apatite.

Despite the small size of the dikes, the deposit has been a source of moderate quantities of mica. The books are cinnamon brown and tend to be flat, free splitting, hard, and in general of good quality. They contain inclusions of quartz and apatite, and many of the sheets are cracked and ruled. Ordinarily the books are very abundant, but few are more than 6 in. in diameter. Appreciable reserves of mica-bearing pegmatite appear to be present.

OTHER DEPOSITS

The information on the following additional deposits in Oconee County was obtained from the Colonial Mica Corporation.

Thomas prospect.—Two pits were dug about 1890 on the D. S. Thomas farm, which is 3 miles northwest of High Shoals (location 49, pl. 39). As exposed in a road cut 50 ft west of the southwest pit, the pegmatite body is 4 ft thick and contains much badly ruled mica.

Branch prospect.—Five-inch mica books are said to have been obtained from a deposit on the J. J. Branch farm $1\frac{1}{4}$ miles southwest of Bishop (location 50, pl. 39). The prospecting was done about 1895.

GREENE COUNTY

Sunshine mine.—The Sunshine deposit, which is on the south side of the Washington road 4.6 miles by road northeast of Union Point (location 51, pl. 39), was worked by Benjamin P. Tuggel for scrap mica in 1944 and 1945. It may be identical with the kaolin deposit described by Veatch (1909, pp. 256-257), who reports that the pegmatite body is 15 to 20 ft thick, trends northwest, and is exposed in a gully for a distance of 150 ft. It was mined in a 40-ft shaft and in two 50-ft drifts from the shaft. The information in this description was obtained from the Colonial Mica Corporation.

MORGAN COUNTY

Data on two deposits in Morgan County were obtained from the Colonial Mica Corporation:

Alliston prospect.—The Alliston deposit is near the Madison-Athens highway and 1.5 miles northeast of Madison (location 53, pl. 39). A 15-ft shaft exposes an irregular pegmatite body that strikes N. 70° E. Books of "A" mica as much as 14 in. in diameter are concentrated along the margins of quartz lenses. Very little sheet material is present.

Carter prospect.—A beryl deposit is on property owned by a Mrs. Carter near Bostwick (location 52, pl. 39). The pegmatite, which is exposed in a small, shallow prospect pit, contains numerous small crystals of beryl.

WALTON COUNTY

Pegmatite is exposed in a cut an eighth of a mile southwest of the railroad bridge across Marburg Creek between Winder and Monroe (location 54, pl. 39). Books of green mica as large as 2 by 5 in. occur along the footwall contact. Information on the deposit was obtained from the Colonial Mica Corporation.

ROCKDALE COUNTY

Jack Bell prospect.—A deposit on the Jack Bell farm, 1 mile north of the South Ocmulgee River and 2 miles northwest of Magnet (location 55, pl. 39), was prospected during the fall of 1942 by Chapman and Severinghaus, who sank a 25-ft shaft and drove a short drift

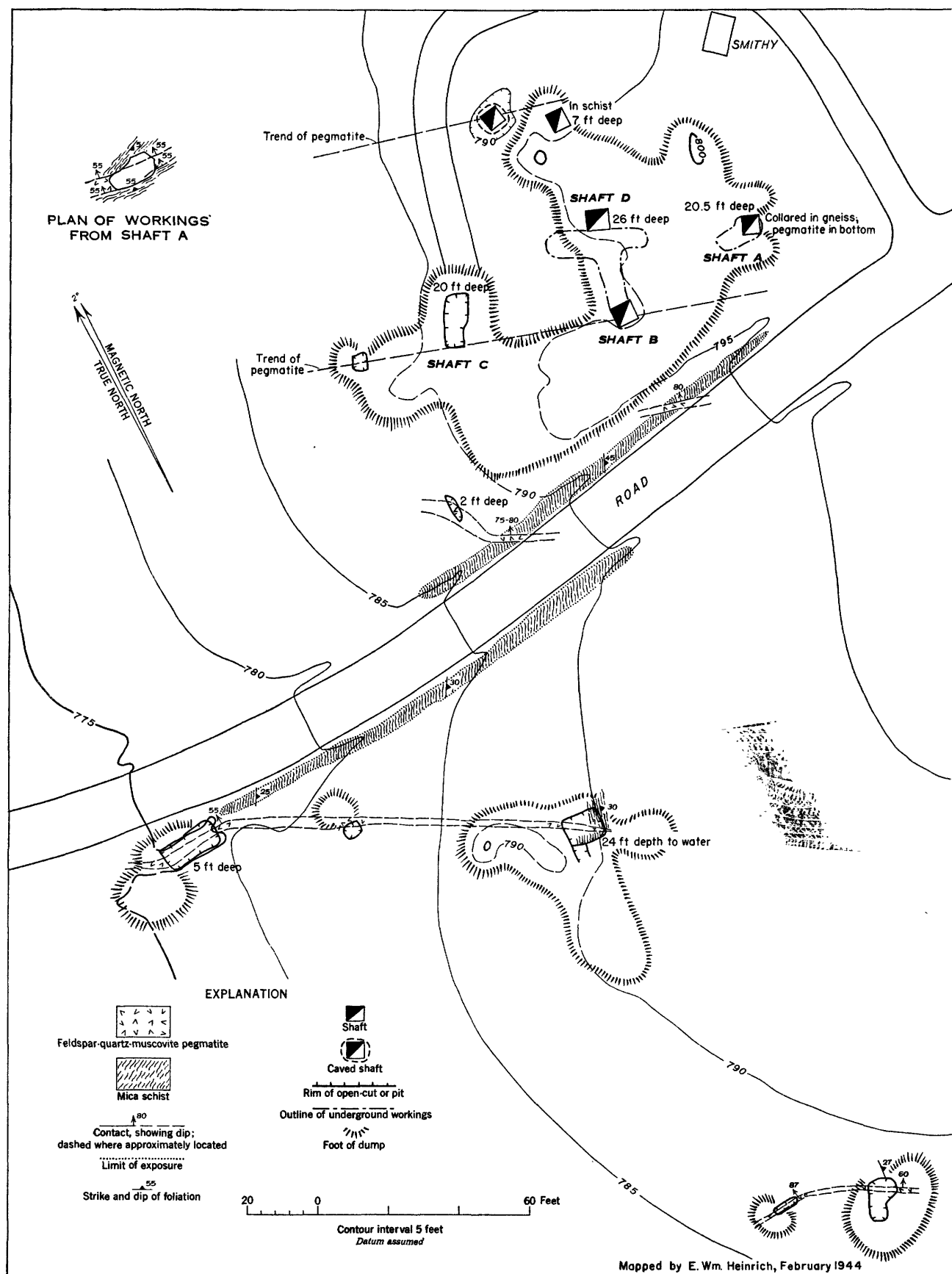


FIGURE 141.—Geologic map and plan of the Dickens mine, Oconee County, Ga.

southwest from its bottom. The vertical pegmatite body, which is 4 to 5 ft thick, strikes N. 53° E. in biotite gneiss that dips 30° SE. An 8- to 12-in. core of massive quartz contains sulfide minerals. Much of the mica occurs in burr rock as small, light-colored, flat books that are ruled and cracked. Information about the Jack Bell prospect was obtained from the report by Furcron and Teague (1943).

DE KALB COUNTY

Vaughn deposit.—A mica deposit on the old Bud Johnson property, which is owned by G. E. Vaughn, Route 2, Lithonia, is on the Philips road 1 mile northwest of the Covington highway and 1 mile N. 60° W. of Lithonia High School (location 56, pl. 39). The pegmatite body, which has not been prospected, strikes north and is at least 10 ft in exposed breadth. It contains mica books as large as 3 by 4 in. The mica is greenish, black-specked, and badly cracked. Another pegmatite body is indicated by float southwest of the farmhouse and the road. Information about the Vaughn deposit was obtained from the report by Furcron and Teague (1943).

FULTON COUNTY

Daniels prospect.—Extensive prospecting was done on the farm of J. L. Daniels in lot 38, Roswell district. The deposit is on both sides of the Fulton County-Cobb County line, 1 mile south of Mountain Park and 7 miles east of Woodstock. In 1943 two pits were dug 300 yd south of the farmhouse (in Cobb County) by M. L. Clein and Bob Lee, of Atlanta. Pegmatite occurs as thin, irregular stringers that contain spotted brownish "A" mica of poor quality.

Seven pits, 5 to 18 ft deep, were dug a quarter of a mile east of the house by A. G. Haynes and H. H. Arnold in 1942. The pegmatite bodies, which are as much as 2 ft thick, strike N. 35° E. and dip 50° SE, in conformity with the foliation of the enclosing biotite gneiss. They contain small lenses of smoky quartz that are surrounded by medium-grained feldspathic rock. The mica is brownish and occurs in heavily spotted, cracked, and curved "A" books. Garnet inclusions are common. In the easternmost pit, which is 10 by 15 ft in plan and 10 ft deep, a 3-ft pegmatite dike strikes N. 15° E. and dips 45° ESE. Much burr rock is present near the hanging wall. The mica is badly spotted, and the books are 2 by 2 in. or smaller.

The report by Furcron and Teague (1943) provided the information on this report.

COBB COUNTY

Information about deposits in Cobb County was obtained chiefly from the report by Furcron and Teague (1943):

Mabry prospects.—Extensive prospecting was done on the V. N. Mabry farm near Wesley Chapel in district 2. The No. 1 prospect, which is in lot 184 half a mile S. 50° W. of the house, consists of a small trench dug in 1942. Four hundred pounds of sheet mica was removed in one operation and 640 lb of sheet and scrap was obtained later. Some of the sheets were as large as 5 by 6 in. The vertical pegmatite body, which strikes N. 10° E. and is 4 to 5 ft thick, is enclosed by mica schist. The wall-rock foliation also strikes N. 10° E., but it dips 47° E. Burr rock is present in the deposit. Some of the mica contains small spots, and ribbon mica is common.

The No. 2 pit, which is 20 ft in diameter and 8 ft deep, was dug in 1942 by means of a power shovel in the southeast corner of lot 176. Only a little scrap mica was obtained from a pegmatite rich in graphic granite. No pegmatite is exposed in the No. 3 opening, which is in the northeast corner of the same lot and 300 ft. S. 34° W. of Wesley Chapel, but a ton of "A" mica and a little flat, brownish, black-spotted mica are said to have been obtained.

Chalker mine.—Mining was done about 1875 in a deposit that is half a mile S. 60° W. of Shiloh Church and is owned by Luther Chalker, of Kennesaw. The old pit is said to have been 100 ft deep, with a drift that extends to the north. Some of the mica occurs as greenish "A" books, but most is brownish and spotted and forms small, hard, flat, free-splitting books. A pegmatite body a fifth of a mile N. 60° E. of the pit is said to have been worked in a shaft many years ago.

PAULDING COUNTY

Information about the following six deposits in Paulding County was obtained mainly from the report by Furcron and Teague:

Dean mine.—A mica mine on the property of Dr. C. W. Dean three-eighths of a mile southwest of Hiram is owned by H. G. House, of that town (location 42, pl. 39). Pegmatite is exposed in the bed of Copper Mine Creek at the site of the old Dean mill. The deposit was worked prior to 1914, and the mine was operated on a large scale by Dr. George Ragsdale in 1919 and 1920. A slumped open-cut 100 ft long and 50 ft wide is said to have been 40 ft deep. Some pits and shafts are in a line that extends 200 ft northeast of the cut.

The pegmatite body is 50 ft in outcrop breadth and trends N. 25° E. It consists of a medium-grained quartz-feldspar rock, coarse pink perthite, and pods of milky quartz. Southwest of the main cut it terminates in a large quartz mass that is 75 to 100 ft in breadth. Greenish "A" mica is associated with the quartz, and brownish-olive mica occurs in the medium-grained feldspathic pegmatite. The books are large and abundant but are heavily spotted. Several carloads of mica are said to have been shipped from the mine.

Cole mine.—Mica was mined during World War I on the R. S. Cole property, which is 3.5 miles southeast of Roses' store, 2.5 miles north of the Carroll County-Paulding County line, and 1¼ miles southwest of 19th Courthouse. The deposit is in lot 180, district 1, section 3. A pit 50 ft in diameter and 25 ft deep was excavated by Frank Leathers and a Mr. Lambert, and a short drift was driven from its bottom.

The dike strikes north and dips 50° E. in biotite gneiss whose foliation strikes N. 50° W. and dips 50° SW. It is 5 ft thick and contains numerous gneiss inclusions. The book mica is light brownish olive, with small black spots. It is curved, cracked, and locally marked by "A" structure. One 125-lb book is reported, and sheets as large as 10 by 12 in. are said to have been recovered.

Choran prospect.—Three small pits were dug in 1943 on the A. E. McBerier estate, which is owned by B. F. Choran, Route 3, Douglasville. The deposit is 3 miles southeast of New Georgia Consolidated School. The mica, which is associated with quartz in feldspar-poor pegmatite, is bright yellowish-green and clear. Most of the books are small and marked by "A" structure.

C. H. Miller deposit.—A deposit owned by C. H. Miller, Route 2, Temple, is a quarter of a mile southwest of 19th Courthouse in lot 1168, district 19, section 3. The pegmatite body strikes N. 35° W. across the foliation of the enclosing biotite gneiss, which trends N. 5° W. No prospecting has been done, but pegmatite float can be traced for a strike distance of a third of a mile. The mica is clear and free splitting and occurs in "A" books as large as 5 by 6 in.

Poole prospect.—Several prospect pits are south of the road and 100 yd southeast of the J. F. Poole residence, 3 miles northwest of Dallas (location 41, pl. 39). The deposit contains spotted, greenish "A" mica.

W. J. Miller prospect.—Twenty-five sacks of mica is said to have been obtained from a deposit on the W. J. Miller farm a quarter of a mile east of 19th Courthouse. The opening is a 20-ft shaft that was sunk about 1941. The mica is greenish, spotted, and marked by "A" structure.

The Colonial Mica Corporation provided information about three additional deposits in Paulding County.

Petty prospect.—A prospect on the M. J. Petty property, a quarter of a mile northeast of the Dean mine (location 42, pl. 39), consists of a 60-ft trench that exposes a pegmatite body with a thick quartz core. The mica books are sparse, small, and marked by "A" structure.

Turner prospect.—Several irregular pits were excavated in a deposit half a mile west of the Turner farmhouse and 5 miles north of Dallas (location 40, pl. 39). The pegmatite body, which contains a quartz core, is enclosed by hornblende gneiss, and gneissic biotite granite is exposed 200 yd to the northeast. Both "A" mica and commercial feldspar are present in the pegmatite.

Soil Road deposit.—A pegmatite body is crossed by a new soil road 5.2 miles east of New Georgia Church on the Villa Rica-Dallas highway. It strikes about N. 37° E. and is 60 to 70 ft in outcrop breadth. It contains medium-grained feldspar and quartz, with abundant small books of scrap mica.

CARROLL COUNTY

Treadway prospect.—A mica deposit on the old J. A. Potate property is 1 mile northwest of Temple, between the Draketown road and the Atlanta and Greenville Railroad (location 43, pl. 39). It is owned by B. W. Treadway, of Temple, and was worked during World War I. The openings consist of a caved shaft and a slumped open-cut that are 50 ft apart. The concordant, lenticular pegmatite body strikes N. 43° E. and dips 72° SE. in garnet-mica schist. It is 4 to 6 ft thick and contains books of greenish mica that are ruled, curved, cracked, tied, badly spotted, and marked by "A" structure. Information on the prospect was obtained from the report by Furcron and Teague (1943).

HENRY COUNTY

Maddox mine.—Mining was carried on in 1914 and 1942 in a deposit 100 yd east of the old Madison Maddox farmhouse, which is 1 mile west of Miller's mill and 6 miles north of McDonough. The workings consist of a narrow open-cut 60 ft long and 30 ft in maximum depth, a small cut 100 ft to the southwest, and a pit a quarter of a mile northeast of the main cut. The pegmatite body, which is conformable with the structure of the enclosing biotite gneiss, strikes N. 63° E. and dips 80° SSE. It is 2 to 3 ft thick and contains a discontinuous core of massive white to rose quartz that is commonly drusy. Tourmaline is associated with the quartz. The mica, which occurs along irregular fractures, is light brown, clear, flat, free splitting, and hard.

The books are ruled, cracked, and locally marked by "A" structure. One 17- by 27-in. crystal was obtained. Information about the mine was obtained from the report by Furcron and Teague (1943).

FAYETTE COUNTY

Porter prospect.—A mica deposit 8 miles southwest of Fayetteville in lot 190, district 6, was prospected about 1940 by the owner, B. D. Porter. Black tourmaline is commonly associated with quartz pods, and at least one large piece of columbite was obtained from the pegmatite. The mica is spotted and marked by "A" structure. Information about the prospect was obtained from the report by Furcron and Teague (1943).

SPALDING COUNTY

Melton prospects.—At least two pegmatite bodies were prospected on the H. B. Melton property 1½ miles east of Griffin (location 57, pl. 39). A thin burr-rock pegmatite body that crops out S. 55° E. of the farmhouse is enclosed by mica schist whose foliation strikes N. 40° E. and dips 45° SE. The mica books are brown, hard, and flat but very small. A 10-ft pit was dug in 1943 by H. B. Martin in a 1-ft concordant pegmatite body that strikes N. 70° W. and dips 45° NNE. The mica is brown and flat, and 1-by-1-in. trimmed sheets could be obtained from the largest books. Data on the prospects were obtained from the report by Furcron and Teague (1943).

Allen prospect.—Beryl-bearing pegmatites were prospected prior to 1913 on the T. J. Allen farm 2 miles north and slightly east of Vaughn (location 58, pl. 39). The country rock is hornblende gneiss. The pegmatite bodies are as much as 10 ft thick and contain white to pink perthite and graphic granite. Tourmaline, rose quartz, and blue beryl of gem quality were found in a field three-eighths of a mile west of the road. Similar beryl-bearing pegmatite occurs on the Rover road 2½ miles southwest of Griffin. Information about the Allen prospect was provided by the Colonial Mine Corporation.

JASPER COUNTY

GENERAL FEATURES

Two narrow, nearly east-west belts of mica-bearing pegmatites occur in Jasper County. One of these is about 2 miles wide and extends from a point northwest of Monticello to a point southeast of Machen, a distance of 8 miles. Deposits as much as 10 ft thick are present in this area, but little prospecting has been done. The other belt, which lies near the southern edge of the county, extends 12 miles from a point east of Gladesville

to a point east of Hillsboro. One outlying prospect near Kelly is recorded as occurring in the northeastern part of the county.

The outlying deposit is in Carolina gneiss (mica gneiss), but most of the deposits in the two main belts are enclosed by hornblende rocks characteristic of the Roan gneiss. The pegmatites in the hornblende gneisses and associated mafic types generally contain vermiculite as a common constituent. It occurs in crosscutting veinlets and seams, as well as in thin selvages along the walls. Muscovite from these deposits is characteristically green and heavily spotted by magnetite. Some of the pegmatites are rich in perthite.

DESCRIPTIONS OF DEPOSITS

C. H. GREER DEPOSIT

A deposit of vermiculite in tract 382-F is exposed in an open-cut about 2,500 ft S. 60° E. of the Gladesville fire tower and about 7 miles southwest of Monticello (location 61, pl. 39). The north rim of the cut is 100 ft south of Georgia Highway 83. The tract was purchased in 1933 from the C. H. Greer Estate by the U. S. Department of Agriculture, Soil Conservation Service, and is part of an area known as the Piedmont plantation project.

A pegmatite body which consists of partly decomposed graphic granite transected by thin veins of vermiculite is exposed in a road cut on the south side of the highway; in an open-cut 500 ft long, 125 ft wide, and 15 ft deep; and in a shallow stripped area between the road and the open-cut. The large opening was excavated almost wholly in pegmatite, which was used locally as road material. The concordant pegmatite body trends north in hornblende gneiss. Its steeply dipping east contact lies along the east rim of the cut and strikes north, but between the cut and the road its strike changes to N. 25° W. The west contact also is exposed in the road cut, where the deposit is about 80 ft thick. It is at least 150 ft thick at the south end of the open-cut.

Quartz, partly kaolinized perthite, vermiculite, and sericite were observed in the well-exposed deposit. The sericite occurs as thin veinlets in graphic granite, which also is cut by 1/8- to 2-in. veinlets of bronze-colored vermiculite. The vermiculite plates, which tend to lie normal to the walls of the veinlets, may have been formed by alteration of biotite that was deposited along fractures.

The greatest concentration of vermiculite is in the stripped area between the road and the cut. In one 50- by 75-ft area it constitutes about 4 percent of the rock, but only a very few veins are present in some nearby exposures. The average vermiculite content in

the 125- by 600-ft area probably does not exceed 1 percent. Small quantities could be obtained by mining the richer parts of the deposit and sorting the ore by hand, but mechanical separation would be necessary in any large-scale operation.

BELL COCHRAN PROSPECT

The Bell Cochran prospect, which is in tract 250 on land owned by the U. S. Department of Agriculture, is $7\frac{3}{4}$ miles N. 86° W. of Hillsboro and 9.4 miles southwest of Georgia Highway 11 (location 62, pl. 39). Mica occurs in a pegmatite body that trends across the Juliette road near the deserted Cochran farmhouse. It is exposed in a road cut, in a stripped area about 50 ft southwest of the road, and in a pit about 200 ft farther southwest. Pegmatite float can be traced across a cottonfield for a distance of at least 200 ft northeast of the road.

In the pit a quartz core is flanked by a wall zone of quartz-muscovite pegmatite (burr rock) and decomposed graphic granite. The contact with the adjacent hornblende gneiss is vertical. Dump material from a nearby caved pit consists almost wholly of quartz. The pegmatite exposed in the stripped area and in the road cut is a graphic to subgraphic intergrowth of quartz and perthitic microcline, with local thin, irregular streaks of fine-grained greenish muscovite. Scattered small, warped books of brownish-olive mica are heavily specked and marked by "A" structure.

TURNER PROSPECT

The Turner prospect, which is in tract 278 about $2\frac{1}{2}$ miles south of Hillsboro, is 0.7 mile N. 15° E. of the administration building at the Piedmont plantation project. It is a few hundred feet north of the Jasper County-Jones County line and within 50 ft of the eastern boundary of the Soil Conservation Service land. It is accessible from the administration building over 1.25 miles of woodland road.

Pegmatite is exposed in two vertical shafts that are 65 ft apart. The deposit appears to trend north and to dip about 30° E. It is at least 5 ft thick in the 10-ft south shaft and consists of a lenticular mass of granular, glassy quartz that is flanked by partly kaolinized blocky perthite, graphic granite, and muscovite. The quartz lens constitutes most of the northern side of the shaft, but it pinches out abruptly to the south. It is underlain by perthitic microcline that grades downward into graphic granite. An irregular 3- to 6-in. streak of mica occurs between these feldspathic units in the south face at the bottom of the shaft. Another streak lies entirely within the perthite.

The 20-ft north shaft exposes about 5 ft of pegmatite that is overlain by decomposed hornblende gneiss. The hornblende has been altered to biotite along the irregular, apparently discordant contact. The pegmatite consists of quartz, perthite with a little intergrown quartz, and small flakes of mica. The mica in both shafts is generally of poor quality. It occurs as green "A" books that are heavily specked, clay-stained, warped, rippled, and cracked. Many are badly tangled. Some 4- by 6-in. books occur, but only a little stained punch mica could be trimmed from them.

ARNALL PROSPECT

The Arnall prospect is 9 miles west of Hillsboro in tract 370. The deposit is exposed along Georgia Highway 83 at points 10.25 and 10.45 miles by road southwest of Georgia Highway 11. Mica streaks in graphic-granite pegmatite appear in the two road cuts, and the distribution of scattered float suggests that the deposit may trend about N. 15° E. The pegmatite consists almost wholly of graphic to subgraphic intergrowths of perthitic microcline and quartz, with irregular streaks of mica and sparsely scattered garnet crystals. Small fragments of quartz-muscovite pegmatite (burr rock) and white quartz are present in the float. The mica books are small and of very poor quality.

OTHER PROSPECTS

Newton prospect.—A 15-ft pit was dug in 1942 by the Morgan County Mica Co. on the property of Mrs. J. L. Newton, 1.5 miles northeast of Kelly (location 59, pl. 39). The pegmatite body, which occurs in mica schist, contains abundant light-brown mica. Most of the books are bent and cracked. Information on the prospect was obtained from the report by Furcron and Teague (1943).

Barron prospect.—"A" mica was obtained from a deposit half a mile north of Hillsboro and 3 miles east of the Monticello-Macon road (location 60, pl. 39). Some old pits were dug in 1913 and 1914, and additional prospecting was done in 1943 by L. D. Gray, of Sunnyside. The pits lie along the margin of a quartz core that strikes east and is 15 to 20 ft in outcrop breadth. Most of the mica occurs along the edges of the quartz. Information on the prospect was obtained from the report by Furcron and Teague (1943).

Athen prospect.—The Athen deposit is on Federal land near the Monticello road and three-fourths of a mile southwest of Gladesville (location 62, pl. 39). Several openings were excavated southwest of a house, chiefly along the margins of a large quartz core. The flanking wall-zone material is coarse-grained, with some blocky feldspar. Vermiculite occurs along the walls,

where it evidently was formed through alteration of the country rock, a biotite-hornblende gneiss. The core-margin mica is light green, spotted, bent, and warped. The Colonial Mica Corporation provided information about the Athen prospect.

HEARD COUNTY

Clark prospect.—Green mica is present in the dump from a pit that was dug about 1890 on the Upson Clark farm, about three-quarters of a mile southwest of the Simpson road. Some books are 6 in. in diameter.

TROUP COUNTY

GENERAL FEATURES

The mica deposits in Troup County occur in two poorly defined, elongate, northeastward-trending areas. The northern area extends through La Grange and is about 7 miles long. The southern area, which is about 8 miles long, extends from Gabbettsville to a point 7 miles south of La Grange. The country rock comprises alternating belts of hornblende gneiss and mica gneiss. Most of the pegmatites occur within hornblende gneiss and characteristically contain greenish, heavily stained mica. Beryl occurs in two of the deposits. The three deposits examined during World War II by the Geological Survey are in the southern area.

DESCRIPTIONS OF DEPOSITS

SMITH'S STORE PROSPECT

Mica-bearing pegmatite occurs on both sides of the Grady Hill road, half a mile west of Smith's Store Crossroads and 7.5 miles southwest of La Grange. It was prospected by the Works Projects Administration in 1941, when three trenches were dug on the north side of the road. The road crosses the east end of a large core of massive white to rose quartz, which trends N. 70° W. and can be traced for a distance of at least 200 ft. It is 100 ft in maximum thickness and appears to be nearly vertical.

One trench near the northeast side of the core is entirely in massive quartz. Two transverse trenches 30 ft apart expose the quartz mass near its northwest end, as well as the flanking feldspar-quartz-muscovite pegmatite. A 6-in. mass of pyrrhotite, partly altered to limonite, was found on the dump from the northwesternmost trench. Greenish wedge-A mica occurs discontinuously along the margin of the core. Much is heavily stained by magnetite.

Several large boulders of fine-grained quartz-feldspar pegmatite are present about 100 ft southeast of the road. The dump from a 14-ft shaft 30 ft south-

west of these boulders contains 4-in. books of flat yellowish-olive mica that is marred by brown spots. The shaft probably is in the pegmatite body exposed north of the road, and the deposit thus may be 350 ft long. The wall zone, which is 25 ft thick at the northwest end, thickens to about 80 ft at the other end. The deposit may have some possibilities as a source of electric mica.

HOGG MINE

The Hogg mica-beryl deposit is 8.6 miles by road south of La Grange and 1.3 miles by road south of Smith's Store crossroads. The mine workings, which are on farmland occupied by H. D. Stephen in lot 184, district 4, consist of about 70 pits of various sizes, 6 large cuts and trenches, 7 shafts, and short caved drifts from the shafts (pl. 42). None of the shafts appears to be more than 25 ft deep. Little mining has been done during recent years.

Four pegmatite bodies occur on the property. Both the country rock, which appears to be a mica schist, and the feldspathic parts of the pegmatites are deeply weathered and in general poorly exposed. In contrast, the massive quartz cores of the deposit form conspicuous outcrops along the tops of low ridges. The pegmatites are very large and occur in a belt that is 350 ft wide and 1,900 ft long and trends N. 70° E.

The poorly exposed easternmost body can be seen in a cut along the west side of the main road, where the nose of a 5-ft quartz core is flanked by 3 ft of kaolinized feldspar-muscovite rock. Black tourmaline is abundant near the margins of the core in crystals as much as an inch in diameter and 6 in. long. Much of it occurs along fractures in the quartz, and the long axes of the crystals tend to be normal to the wall-zone contact (fig. 142). Much of the tourmaline is cut by thin veinlets of quartz. The pegmatite body is not exposed west of the road cut, but abundant quartz and tourmaline float can be traced westward for a distance of about 150 ft.

The No. 1 and No. 2 pegmatite bodies (pl. 42) may be parts of the same mass. The No. 1 body contains a quartz core that is rounded in plan and about 80 ft in diameter. A set of well-defined fractures in the quartz strikes N. 50° to 80° E. and dips 78° NV-N. to 75° SE-S. Alternating milky and clear layers in the quartz strike N. 10° W. and dip steeply west. The southeast end of the pegmatite body has been prospected for mica. Several shallow pits in the thick wall zone expose kaolinized feldspar, granular quartz, muscovite, and accessory black tourmaline.

The No. 2 pegmatite body, which trends N. 85° E., is 550 ft long and about 120 ft in exposed breadth. A conspicuous quartz core is 430 ft long and as much as

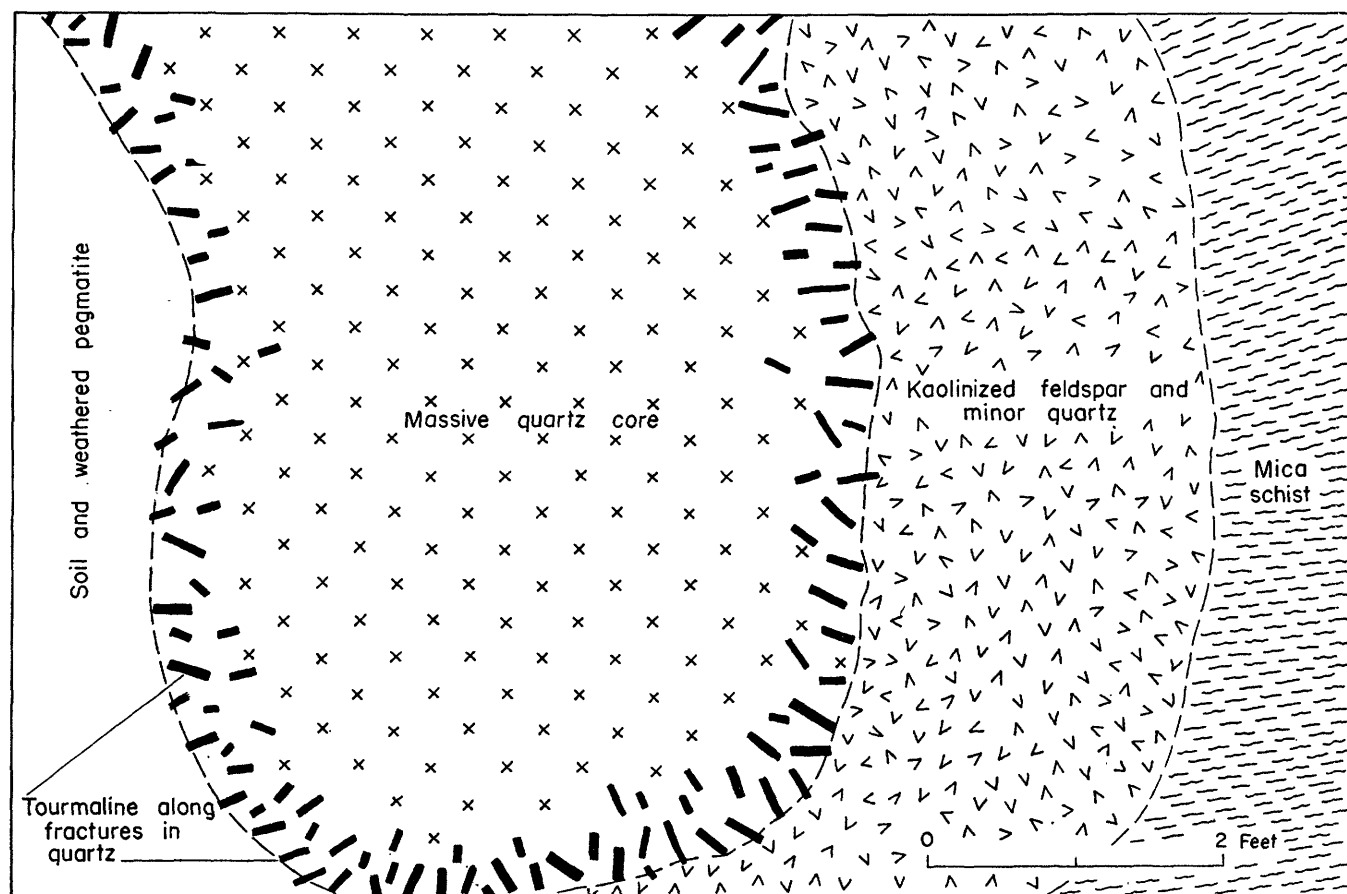


FIGURE 142.—Exposure of the easternmost pegmatite body in the road cut at the Hogg deposit, Troup County, Ga.

65 ft wide. Its northern wall dips 50° S. and its southern wall 40° to 75° N. This quartz mass, and possibly the entire pegmatite body, may taper downward to a well-defined keel that plunges east-southeast at low angles. Clear and milky layers in the core strike N. 50° E. to S. 70° E., with vertical or steep northwest to north-northeast dips. In general the attitude of this layering is quasi conformable with the axial plane of the pegmatite body. The quartz is clear, milky, gray, smoky, and rose-colored.

Along the margins of the core is a discontinuous intermediate zone rich in yellowish-olive to yellowish-green "A" mica. It is 5 ft in maximum thickness. The wall zone consists of medium-grained quartz, decomposed feldspar, and muscovite. Two pegmatite units that contain abundant pale-greenish beryl occur in this zone along the south side of the pegmatite body. The larger of these may be as much as 5 ft thick, but neither is in contact with the quartz core. The beryl has a porcelanoid texture, and crystal fragments as large as 2 by 4 in. were noted. A few fragments of pale-blue beryl also are present in the massive-quartz debris. The dump near the east end of the long trench at the

southwest end of the No. 2 pegmatite contains abundant fragments of weathered, dense, fine-grained altered diabase.

The No. 3 body, the largest of the group, is 680 ft long and as much as 120 ft wide. It trends N. 75° E. and contains a quartz core 540 ft long and as much as 70 ft in outcrop breadth. The contacts of the core dip inward, suggesting a subjacent keel similar to that in the No. 2 pegmatite. Tourmaline is abundant along the nose, or east end, of the quartz mass, and garnet crystals as much as 2 in. in diameter occur along the southern margin near the nose. Around this end of the core a partly developed intermediate zone of decomposed blocky feldspar (perthite?) is about 100 ft long and as much as 10 ft thick. A muscovite-rich outer intermediate zone lies adjacent to the blocky feldspar unit and extends beyond its ends to flank the core itself. The wall zone contains decomposed feldspar, quartz, small foils and books of muscovite, and local biotite.

A peculiar rock type is exposed in a short incline near the southeast end of the deposit. Tightly intergrown 1- to 2-in. flakes of dark yellowish-green muscovite

with varying quantities of decomposed feldspar (probably plagioclase) form the centers of rosettelike bodies as much as 5 ft in diameter. Muscovite locally constitutes 80 percent of this rock. Surrounding it are coarse, radiating aggregates of wedge-A mica and tourmaline crystals (fig. 143). These outer layers are

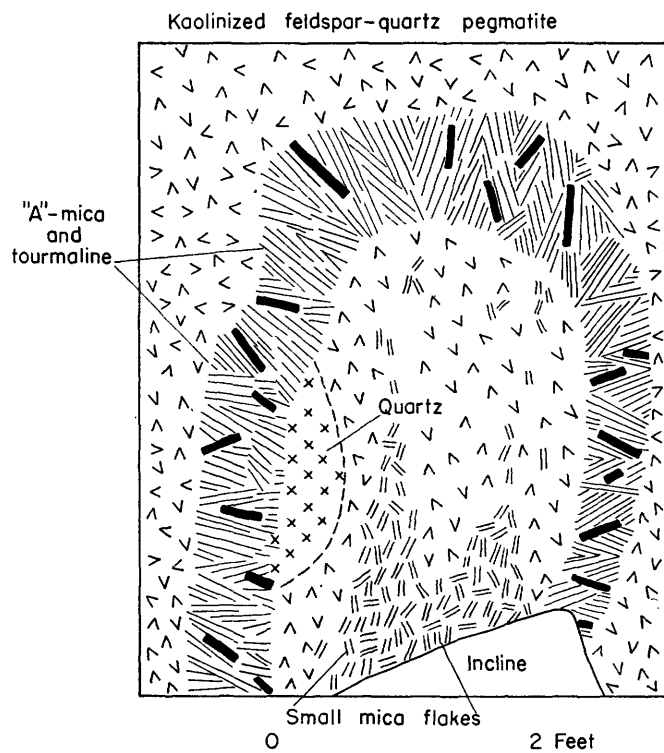


FIGURE 143.—Rosette structure in the east end of the No. 3 pegmatite Hogg deposit, Troup County, Ga.

6 to 8 in. thick. The rosettelike masses of rock may have been formed by the replacement of wall-zone pegmatite.

The No. 4 pegmatite body, which is the smallest of the group, is 10 ft thick and may be as much as 140 ft long. It contains a thin border zone of fine-grained quartz-feldspar rock, a hanging-wall zone rich in muscovite, and a central zone of medium-grained quartz and decomposed feldspar.

Mica is abundant in all but the eastern pegmatite body, and several types of books occur in different zones. In the No. 1 deposit flat books are scattered throughout the wall zone. They are very heavily stained by magnetite, and thin sheets are yellowish to brownish olive. Books 2 in. or less in diameter are very abundant, and some books as large as 2 by 4 in. are present in the dumps. In the No. 2 body the wall-zone mica is similar to that in the No. 1. Core-margin mica from the intermediate zone, on the other hand, occurs as clear, bright

yellowish-olive to yellowish green wedge-A books as much as 10 in. in diameter.

Three types of mica are present in the No. 3 deposit. The wall-zone mica is yellowish to brownish olive, very heavily stained, flat, and generally small. In the outer intermediate zone are very heavily specked "A" books that contain some wedge structure. Their maximum diameter appears to be about 5 in. Mica occurs in the outer parts of the rosettes as greenish wedge-A books, and that in the centers as small, tightly intergrown flakes. The mica in the No. 4 deposit is heavily stained. Abundant flat books 3 in. or less in diameter occur in the wall zone.

Possibilities for future production of mica from the deposit appear to be very good. Nearly all the material is of electric or scrap grade, but clear sheets as large as 3 by 4 in. could be trimmed from the flat portions of "A" books in the core-margin zone of the No. 2 deposit. Large quantities of small stained sheets could be obtained from the wall zones, and the moderate reserve of rosette mica might be a satisfactory basis of operations for scrap. Beryl probably could be recovered as a by-product, and kaolin also could be mined if a satisfactory market were available.

WORD PROSPECT

The Word beryl deposit is in lot 161, on the property of W. B. Word, of Atlanta, and is 13 miles by road from La Grange. It can be reached from that town over 11 miles of U. S. Highway 29 and a dirt road that extends through Gabbettsville. The beryl was discovered by employees of the Works Projects Administration, who removed about 800 lb of the mineral. Later an option and prospecting rights were obtained by Paul Corrigan and Hamilton Hart.

The area in the immediate vicinity of the discovery cut was prospected by the U. S. Bureau of Mines. Several pits were dug in an unsuccessful effort to find extensions of the deposit, but deepening of the original pit yielded 1,033 lb of beryl. Total production from the deposit amounts to about a ton. The mineral is green to greenish white and occurs in crystals 1/2 in. to about 12 in. in diameter. Some is stained by limonite.

The discovery pit, which lies a few feet west of the road, is 18 ft long, 12 ft wide, and about 14 ft deep. The pegmatite exposed along the walls is an aggregate of perthite, gray quartz, small muscovite, and accessory biotite and black tourmaline. Beryl was not seen in place. The muscovite is brownish olive and very heavily stained. Hornblende gneiss is present along the nearly vertical southeast contact and also is exposed on the northwest side of the deposit in the drainage ditch from the north corner of the pit. The pegmatite appears to be 10 to 12 ft thick.

Most of the debris from the prospect holes southwest of the discovery pit is weathered gneiss. Pegmatite is present in the dumps from shallow, older diggings on the northeast side of the road, and this part of the area may offer some promise for further trenching. An outcrop of quartz-feldspar pegmatite is northeast of the main old pit.

OTHER DEPOSITS

Ben Burts mine.—The Burts deposit, which is 9 miles S. 47° E. of La Grange, is north of Flat Shoals Creek and 1 mile east of the La Grange-Chipley highway (location 46, pl. 39). It is owned by W. H. Enlaw, of Brookside, Ala., and was worked in 1918 and 1919, as well as in 1942, by means of two shafts and an open-cut. The concordant pegmatite body, which is 2 to 6 ft thick, strikes N. 15° E. and dips 70° ESE. The mica is light-colored, hard, and clear, but is marked by "A" structure. Most is scrap. Information on the mine was obtained from the report by Furcron and Teague (1943).

Crosby prospect.—The Crosby deposit is 1 mile north of the La Grangetown square (location 44, pl. 39). Two pits were dug in 1942 by the Works Projects Administration 400 ft northeast of the house, and a shaft was sunk in 1943 from a point 30 ft to the west by Bob Lee and M. L. Clein, of Atlanta. The Lee-Clein shaft is connected with the older workings by an incline. The deposit, which strikes north and dips 20° to 35° W., is an 8- to 15-ft thickness of interlayered schist and pegmatite. Lenses of smoky quartz occur in the thickest pegmatite layers, and some burr rock is present near their margins. The book mica is greenish and clear, but is tangled, curved, and cracked, and contains flattened garnet crystals. "A" books as large as 6 by 8 in. are present. The mica is chiefly scrap. The Colonial Mica Corporation provided information on this deposit.

Davis deposit.—Sheets of heavily stained mica as much as 4 in. in diameter have been obtained from "A" books on the farm of Virgil E. Davis, 3½ miles west of La Grange (location 45, pl. 39). Information on the deposit was provided by the Colonial Mica Corporation.

MERIWETHER COUNTY

Snelson prospect.—Mining was done in 1942 by C. M. Wacaster on the A. Snelson property 5 miles west of Woodbury (location 47, pl. 39). A sloping open-cut 40 ft long, 8 ft wide, and 15 ft deep was excavated at a point half a mile west of the house, and a shaft of undetermined depth was sunk about 25 ft to the west. The concordant pegmatite body, which is 2 to 3 ft thick, strikes N. 20° W. and dips 60° WSW. in biotite gneiss. It consists of medium-grained feldspar, quartz, muscovite, and black tourmaline. The mica occurs as hard, brown "A" books that are cracked and spotted. Information about the Snelson prospect was obtained from the report by Furcron and Teague (1943).

TALBOT COUNTY

Martin mine.—The Martin deposit is on the south side of the Woodland-Thompson road and 6 miles east of Woodland (location 48, pl. 39). It was worked through three closely spaced 30- to 40-ft shafts, chiefly in 1913 and 1914. The country rock is biotite gneiss in which the foliation strikes northeast and dips southeast. Pegmatite is not exposed, but much scrap mica is present in the dumps. Several barrels of selected mine-run mica is said to have been shipped. The Colonial Mica Corporation provided information about the mines.

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